A REVIEW OF GROUND TARGET MASKING EFFECTS

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Falcon Research and Development Company

Prepared for:

Naval Weapons Center

June 1974

Naval Weapons Center

AN ACTIVITY OF THE NAVAL MATERIAL COMMAND

Paul E. Pugh, RADM, USN ..... Commander
Leroy Riggs ..... Technical Director (Acting)

FOREWORD

This report documents the work conducted from September 1972 to May 1974 by Navy personnel and under Naval Weapons Center Contract N00123-72-C-0422. The work is part of a joint services program on air-to-ground target acquisition.

The Joint Technical Coordinating Group for Munitions Effectiveness has established a Target Acquisition Working Group (TAWG) under the Joint Munitions Effectiveness Manual/Air-to-Surface Division. Current TAWG tasks include documenting the use of target markers in airborne forward air controller operations, the classification of terrain as to its effect on target acquisition difficulty, research on target acquisition by flarelight, summary and synthesis of existing target acquisition field test data by direct vision and electro-optical sensors, and the description and evaluation of mathematical models of the visual and sensor-aided target acquisition process.

This report has been reviewed for technical accuracy by R. A. Erickson. It is released at the working level for informational purpose only.

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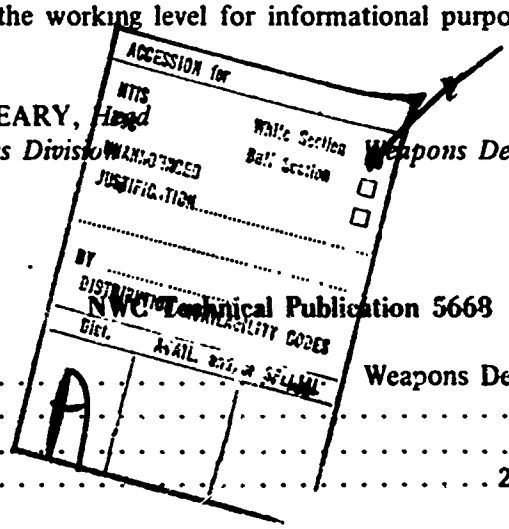

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(U) *A Review of Ground Target Masking Effects* by Carol J. Burge, Naval Weapons Center, and Robert L. Stohler, Falcon Research and Development Company. China Lake, Calif., Naval Weapons Center, June 1974, 108 pp. (NWC TP 5668, publication UNCLASSIFIED.)

(U) This report documents a literature survey of terrain-masking of ground targets. Target masking is defined and several definitions are given of the probability of unmask as a function of observer altitude and of the range from the observer to the target. Efforts to determine the probability of unmask are divided into three categories: (1) measurement of line of sight made directly on the terrain, (2) measurements of line of sight made on profiles constructed from topographic maps, and (3) predictions based on roughness characteristics of the terrain, such as average slope or standard deviation of altitudes.

(U) Available data are compared and evaluated. It is concluded that field measurement is the best way of determining target masking and that there is not nearly enough data accumulated to meet the need of users.

CONTENTS

INTRODUCTION

This study examines and summarizes the available knowledge concerning ground target masking due to terrain irregularities and vegetation concealment. It includes reviews of those published documents that could be obtained within the time period of this work.

Of basic concern are the range and altitude required of an aircraft in order to have a clear line of sight to a target. In this report the probability of having an unobstructed view is the major measure of masking. It is recognized that many other factors must be considered before a probability of actually *detecting* a target can be established. Throughout this report, probability refers only to having an unobstructed view of the specific point or area. However, the masking parameter considered here is a predominant factor in many air-to-ground operations and establishes a maximum limit on the ability to optically detect a ground target.

This report also contains masking data measured during the course of the Joint Task Force Two (JTF-2) tests. The data represent measurements of masking angle from target center for 16 Test 4.4 targets and 8 Test 4.1 targets. Results are presented as probability curves, and also as tabular data in the Appendix.

MASKING OF TARGETS

DEFINITION

Most target masking studies attempt to solve the problem: given an area of terrain, what is the probability of there being an unobstructed line of sight to a target located somewhere in the area? If there is an unobstructed line of sight to an object, we say the object is unmasked. This report is concerned only with masking by the ground and things on the ground; not by such objects as clouds. Figure 1 illustrates terrain-masking of a target. The probability of unmask depends on:

Altitude of the observer
Distance to the target
Height of target
Roughness of terrain
Type of foliage
Type of cultural features.

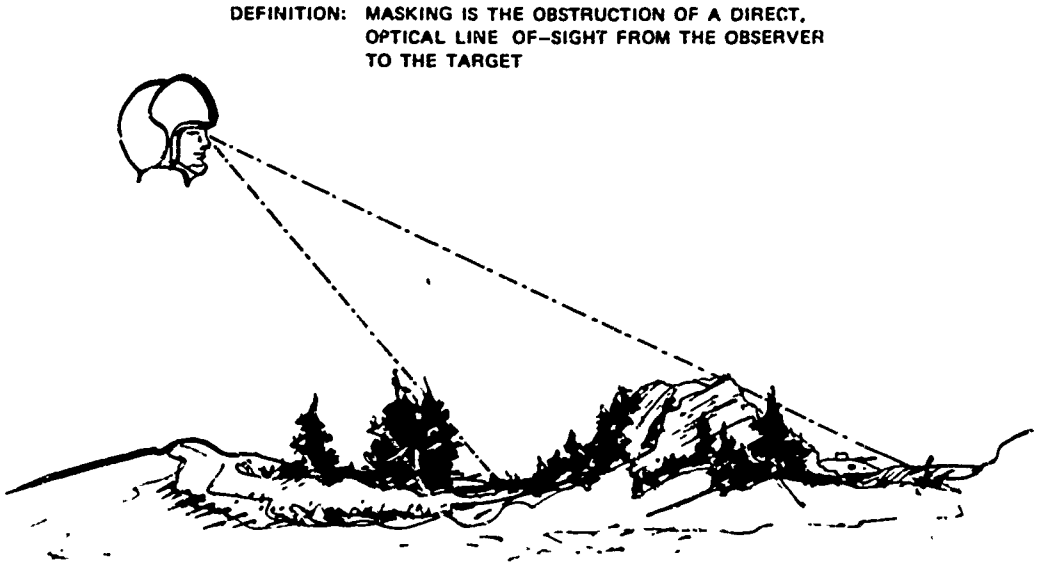


FIGURE 1. Illustration of Terrain-Masking of Target.

DEFINITIONS OF PROBABILITY OF UNMASK

The probability of unmask has been defined as various functions of range. These are listed below and illustrated in Figure 2.

1. The probability that a target is exposed at a ground range, r, from the observer. This is the most commonly computed probability of unmask.

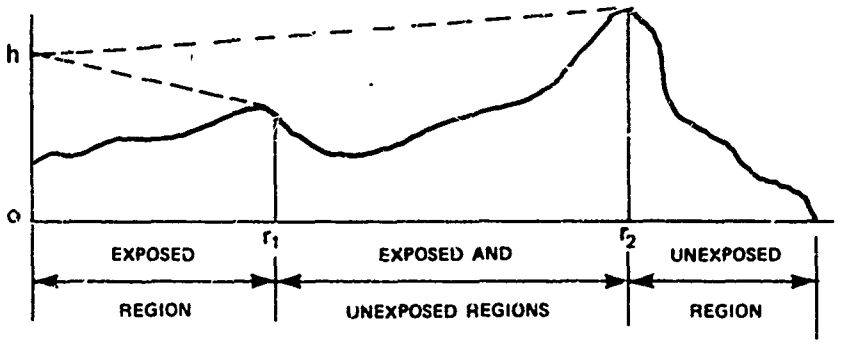
2. The probability that the target is exposed throughout the entire range from the observer to r.

3. The probability that a target, randomly located between r_1 and r_2, is visible to an observer.

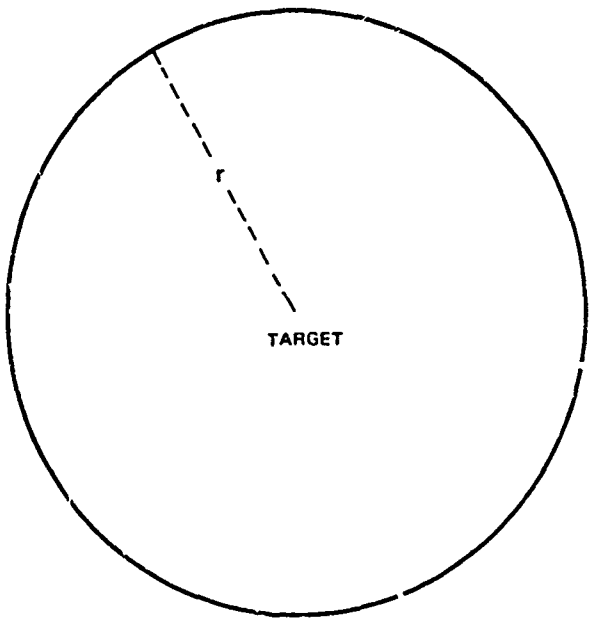
4. The probability that there is no distance greater than r at which a target will be exposed.

5. The probability that a fixed target will be visible throughout 360 deg of azimuth and at range, r, from it.

The probability of unmask has also been defined as the average percent of an area in view.



(a) Illustrates definitions 1 through 4: Probability that a target is exposed at r, from 0 to r, between r_1 and r_2, not beyond r_2.



(b) Illustrates definition 5: Probability that a fixed target will be visible throughout 360 deg of azimuth and at range, r, from it.

FIGURE 2. Illustration of Probabilities of Unmask as Functions of Range.

MEASUREMENT OF PROBABILITIES OF UNMASK

Probabilities are found by defining a rational fraction based on the number of successful attempts to have a clear line of sight to the target within a defined area. Sightings have been made in the field, on scale models of the terrain, and on profiles drawn from topographic maps. Most studies have assumed that target location is equally likely anywhere in the area. Several approaches to obtaining a representative sample of sightings and calculating probabilities of unmask have been used. For field and map measurements, there are basically two techniques.

Method 1. Observer-Based Measurements. Obtaining sightings from an observation point to a target or points on the ground from one end of a straight line as the target is moved along the line (Figure 3). This is done for several lines on the same type of terrain so that, for each range from the observer to target, there are several sightings from which to compute the probability of unmask. This technique can be used in the field, on scale models, or on profiles of terrain reconstructed from topographic maps.

Method 2. Target-Based Measurements. Taking sightings from a target outward to determine the elevation of the lines of sight necessary to clear the masking objects around the target (Figure 4). The probability of the target being unmasked at a given range and altitude can be computed by comparing points on a circle around the target (having a radius equal to the given range and at the given altitude) with the lines necessary to clear the masking features around the target. If a point falls below the mask line, no clear line of sight will exist from it. The ratio of points with a clear line of sight to all those tested is the probability of that target being in view at the given range and altitude from any direction. To obtain a probability for any target randomly located in an area, the probability defined above would have to be computed and combined for many targets in the area.

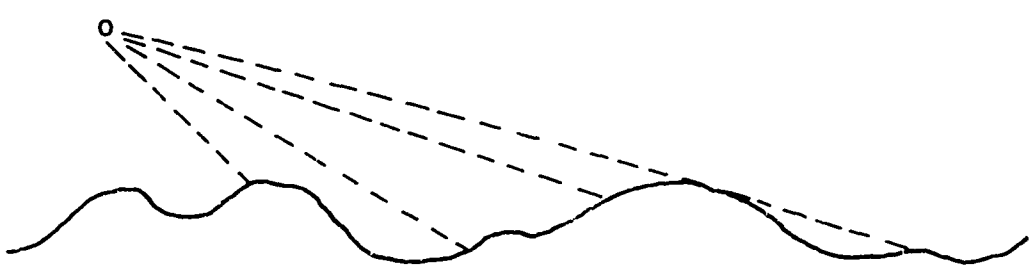


FIGURE 3. Observer-Based Measurements.

FIGURE 4. Target-Based Measurements.

MAP AND FIELD STUDY DATA

Nine references dealing directly with masking were reviewed for this report. They are summarized in Table 1.

Ballistic Research Laboratories (BRL),[1] Erickson,[2] and Gill[3] (see references, Table 1, p. 8) used method 1 for obtaining sightings of the target. BRL constructed scale models of terrain from field measurements made by conventional surveyor's techniques. The measurements were made with and without foliage. In each area studied, they chose two representative rays 7,000 ft long and oriented perpendicular to each other. Scale models of the rods used for targets were moved along the ray. A string was stretched from the observation point at one end of the ray to the target. They observed whether the string was intersected by either an opaque object on the model or the model itself. If there was an intersection, a clear line of sight to the target did not exist at that point.

BRL also constructed profiles and computed unmask probabilities of the same areas using topographical maps with 20-ft contour intervals. They computed probability types 1, 2, 3, and 4 (see definitions given earlier). Their curves for the probability that a target is exposed at r_1 are shown in Figure 5. The probability that the target is exposed throughout the entire range from 0 to r is shown in Figure 6.

Erickson and Gill divided 12,000-ft squares of terrain into 8 x 8 grids, then constructed profiles of each grid line from topographic maps. They took sightings at thousand-foot intervals along the grid line from both ends of each grid line. The percent of each line visible from each end was used to compute the average percent of the total area in view (shown in Figure 7). The 32 data points at each range were used to compute the probability for that range as shown in Figures 8 and 9.

JTF-2 used the second method for measuring probabilities. They measured the angle necessary to clear the highest object and the ground range to that object every 10 deg for 360 deg around their targets.

TABLE 1. Summary of Masking Studies.

Reference	Source of data	Measurement	Product	Type of terrain	Range, ft	Altitude, ft
1	Scale model made from field survey and profiles drawn from topographic maps with 20-ft contour lines	Visibility of 3.5- and 7.0-ft rods from points above the origin of a 7,000-ft ray. Field survey done with and without foliage.	Probability of target exposure at r, throughout the interval from 0 to r, between r_1 and r_2, and of nonexposure beyond r.	Rolling fields fairly free of vegetation, within 25 mi of Baltimore.	0-7,000	6.5-324
2	Profiles drawn from topographic maps, 20-ft contour intervals.	Visibility of points on the ground from points above the end of a 12,000-ft strip of terrain. Average slope and number of slope changes for each type of terrain.	Probability of terrain exposure vs. range and average number of slope direction changes and average percent of terrain in view for each type of terrain.	Smooth, moderately rough, very rough.	0-12,000	0-3,000
3	Profiles drawn from topographic maps, 20-ft contour intervals	Same as Ref. 2.	Comparison with BRL's probability curves for the same region. Results not the same.	Same as Ref. 1	0-12,000	0-324
4	JTF-2 field survey	Computer program compared lines of sight of interest with measured lines of sight necessary to clear the masking features around a target.	Probability that target unmasked at range r for 360 deg around it.	Gently rolling with low mountain ranges (Ark.-Okla.)	0-15,000	0-3,000
5	Unknown	Unknown.	Probability of acquiring a tank from an aircraft. Includes other factors beside terrain-masking.	Modestly rolling midwestern type, estimated slope 0.5 deg.	0-24,000	300-3,000
6	Unknown	...	Probability of target in view vs. range, derived from average terrain height, standard deviation of altitudes and frequency distributions and autocorrelation functions.	Various land types in Korea and Germany.	0-14,764	0-380.6 One of the local terrain altitudes
7	Topographic maps, photos, JTF-2 field survey data	JTF-2: from the center of a target outward, elevation angle to clear masking and ground range to masking feature for each 10 deg in azimuth about the target. Slivinsky estimated mask angles for the same targets from maps and photos. Includes vegetation.	Comparison between measured and estimated masking angles.	Gently rolling with low mountains, (Ark.-Okla.)	5,000	...

TABLE 1. (Contd.)

Reference	Source of data	Measurement	Product	Type of terrain	Range, ft	Altitude, ft
8	Theoretical statistical distributions, rough contour maps 324-ft contour interval	...	Suggests that, for a valley, if hw/Rd remains constant, the percent of the valley visible is a constant; where h = height above top of valley, w = width of valley, r = range from closest lip of valley, and d = depth of valley below surrounding terrain.	Valleys of various shapes	...	...
9	Theory	...	Equations for hypothetical triangular waveform terrain. Rectangular blocks for vegetation. Compares masking data on this theoretical terrain with BRL measured data.	...	...	...

[1]Ballistic Research Laboratories. *An Analysis of Results of a Ground Roughness Survey, III.* Aberdeen Proving Ground, Md., May 1959. (Report No. 42, publication UNCLASSIFIED.)

[2]U. S. Naval Ordnance Test Station. *Empirically Determined Effects of Gross Terrain Features Upon Ground Visibility From Low-Flying Aircraft*, by Ronald A. Erickson. China Lake, Calif., NOTS, 13 September 1961. (NAVWEPS Report 7779, NOTS TP 2760, publication UNCLASSIFIED.)

[3]U. S. Naval Ordnance Test Station. *Terrain Effects Upon Air-to-Ground Target Visibility*, by Carol Gill. China Lake, Calif., NOTS. (IDP 1487, publication UNCLASSIFIED.)

[4]The Dikewood Corporation. *User's Manual for VISTRAC Model*, by June G. Brenton and Patricia R. Howard. Albuquerque, N.M., December 1968. (DC-TR-Test 4.4-18, publication UNCLASSIFIED.)

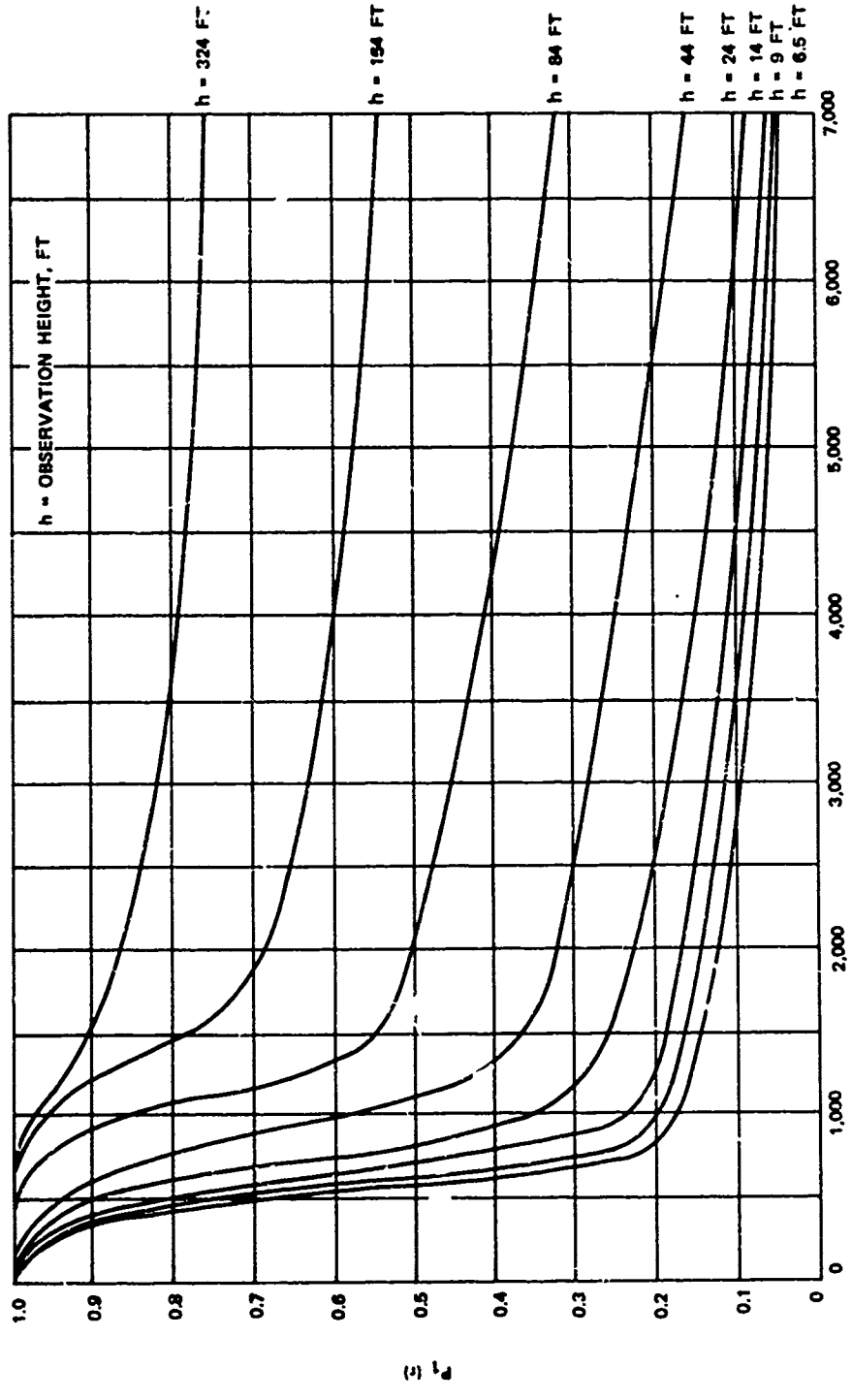
[5]General Dynamics/Convair. *Visual Detection From Aircraft*, by Asbjorn Linge, San Diego, Calif., December 1961. (ERR-SD-150, publication UNCLASSIFIED.)

[6]Peat, Marwick, Caywood, Schiller & Company. *A Study of the Effects of Terrain on the Detection of Low Flying Aircraft.* Chicago, Ill., 1 May 1964. (D/A Project No. 503-05-005, publication UNCLASSIFIED.)

[7]The Dikewood Corporation. *Target Masking Methodology in the Mathematical Model for JTF-2 Test 4.4*, by Sandar H. Slivinsky. Albuquerque, N.M., 14 August 1967. (DC-TN-2047-11, publication UNCLASSIFIED.)

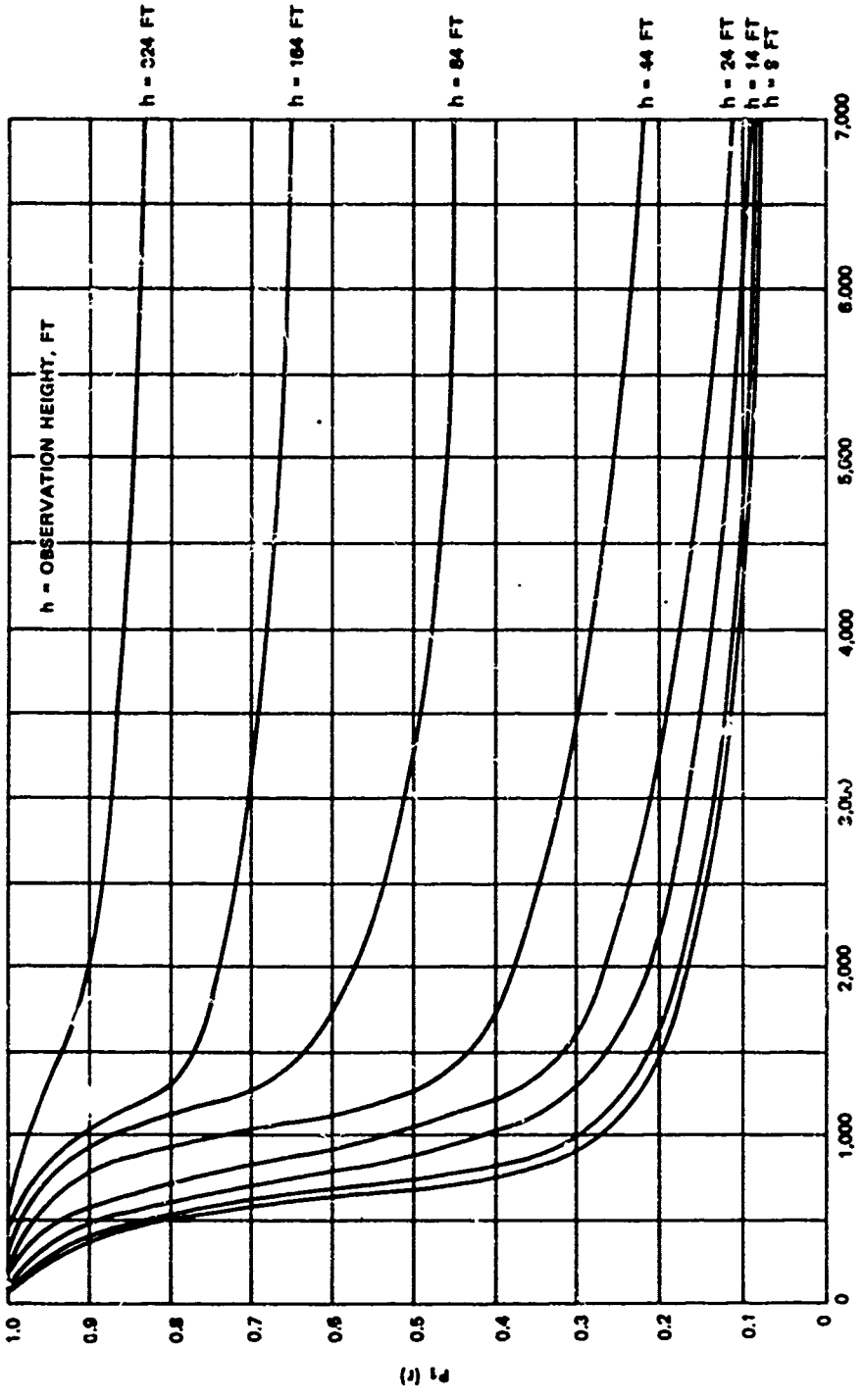
[8]University of Michigan, Institute of Science and Technology. *An Approach to Line-of-Sight Problems in Surveillance-Equipment Specification and Evaluation*, by James M. Wolf. Ann Arbor, Mich., November 1961. (Report No. 2900-254-T, AD 266961, publication UNCLASSIFIED.)

[9]Cornell Aeronautical Laboratory, Inc. *Aerial Observer Effectiveness and Nap of the Earth*, by Ewald Ryll. Buffalo, N.Y., February 1962. (Project TRACE Final Report, VE-1591-G-1, publication UNCLASSIFIED.)



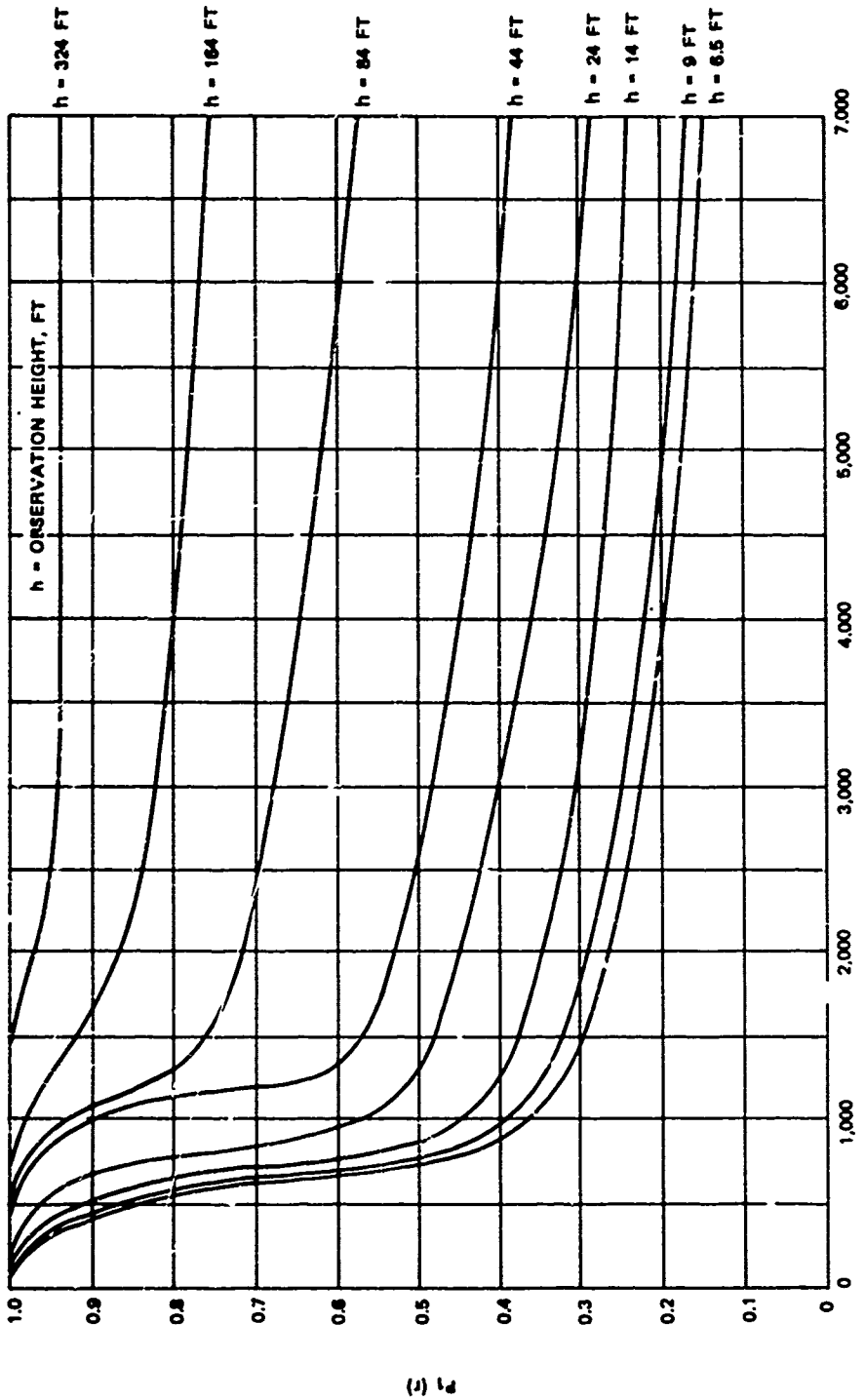
(a) Field study; foliage included; rod height = 3.5 ft

FIGURE 5. Average Probability That a Rod at a Fixed Distance Is Exposed.



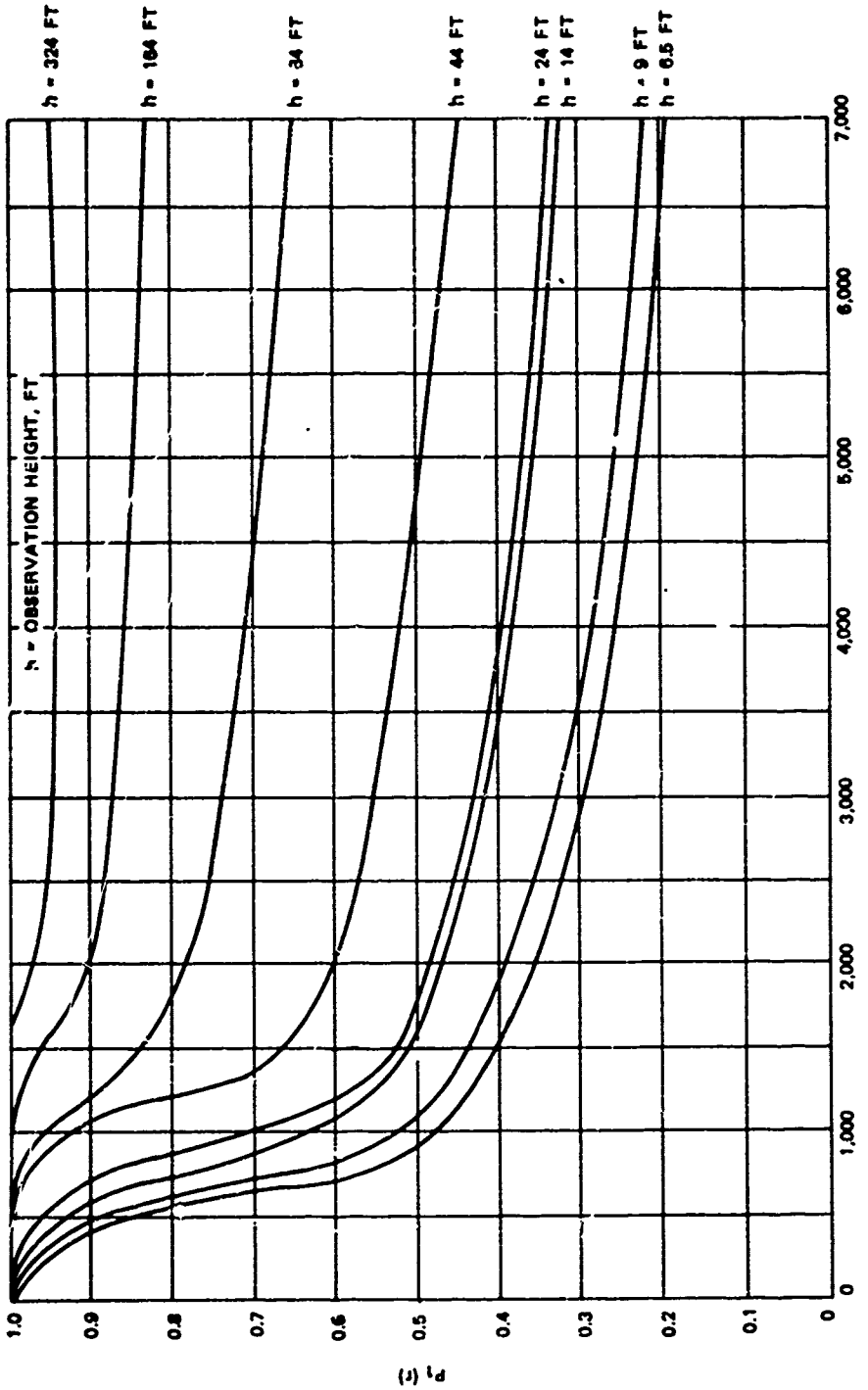
(b) Field study; foliage included; rod height = 7.0 ft.

FIGURE 5. (Contd.)



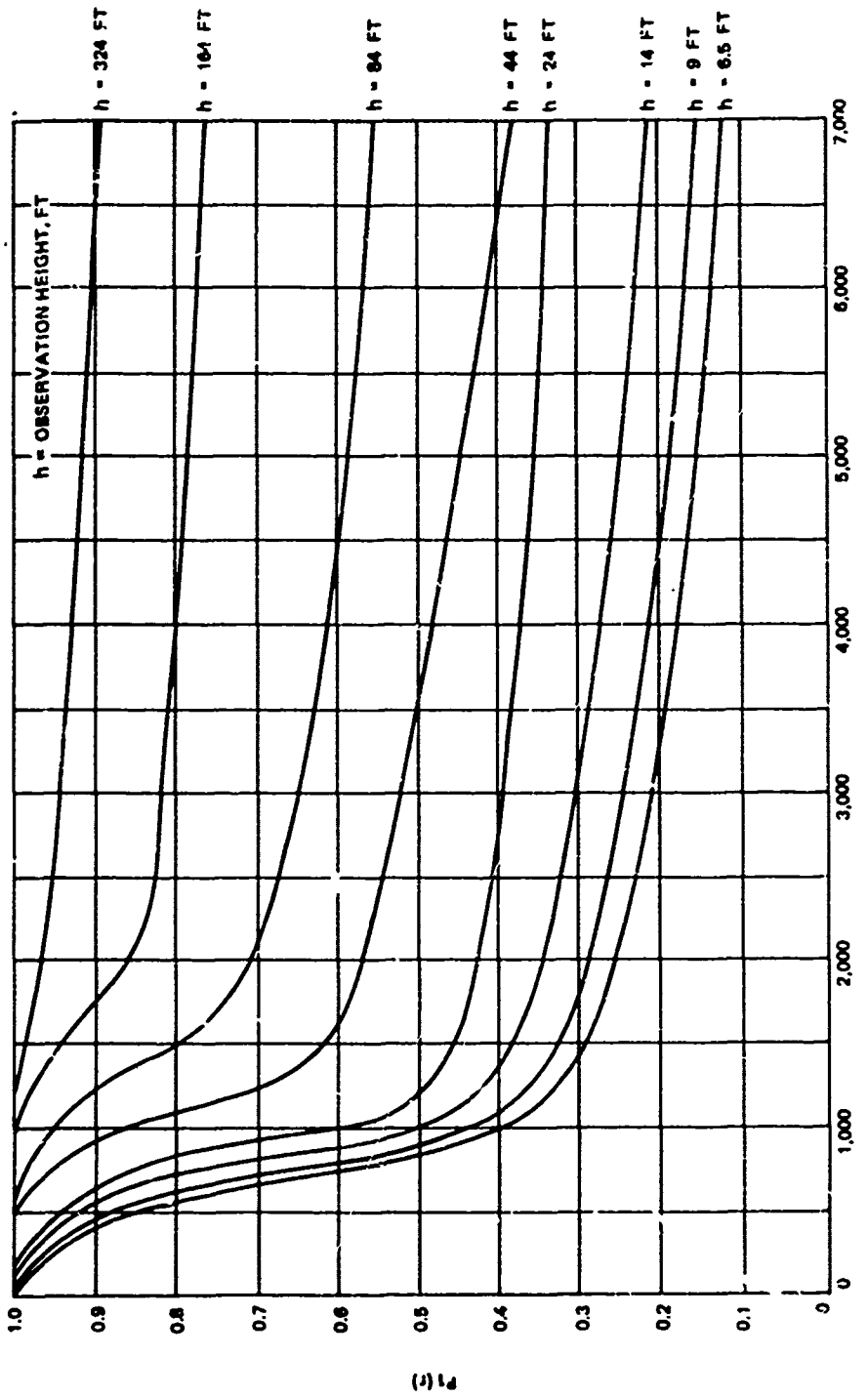
(c) Field study; foliage excluded; rod height = 3.5 ft.

FIGURE 5. (Contd.)



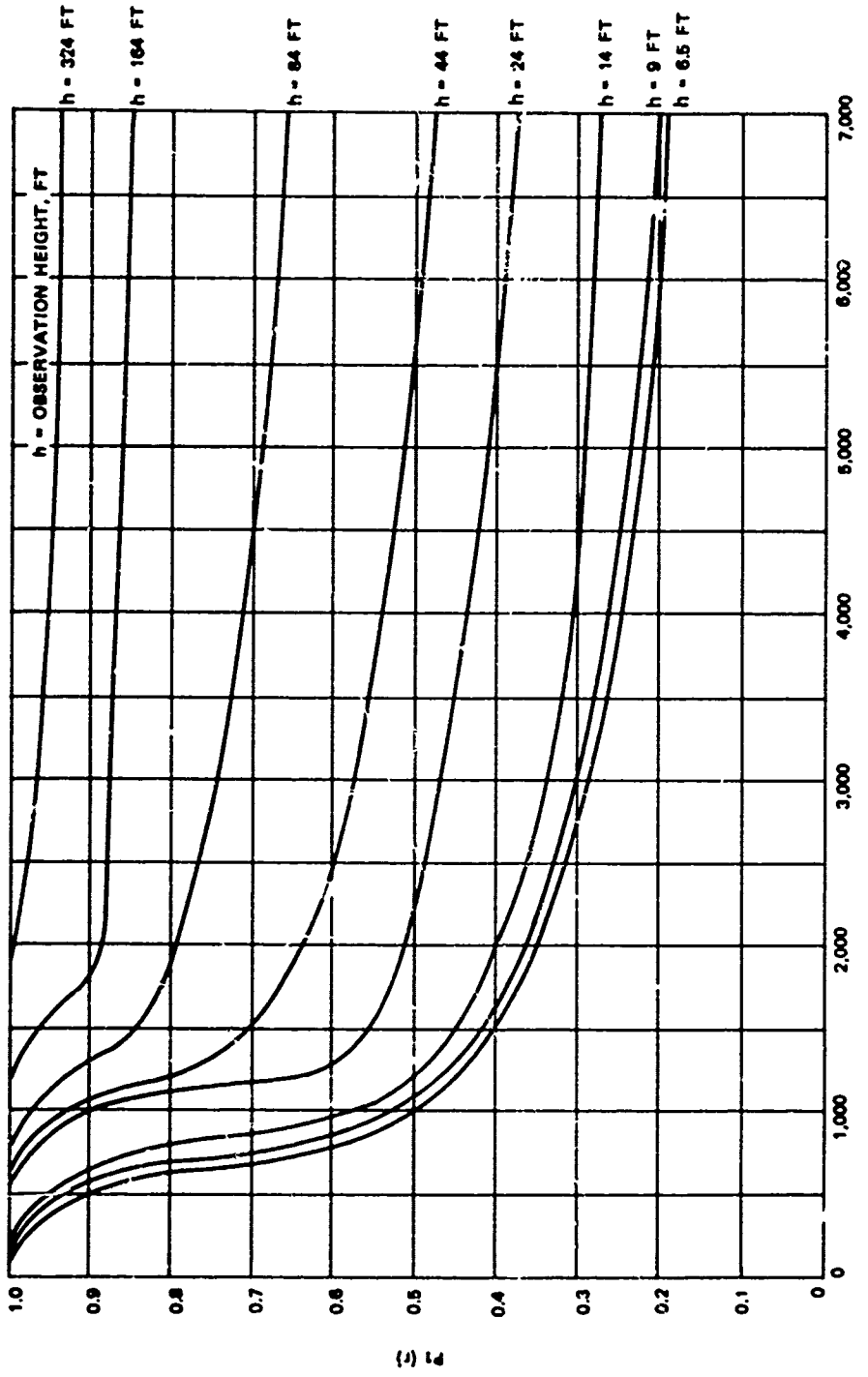
(d) Field study; foliage excluded; rod height = 7.0 ft.

FIGURE 5 (Contd.)



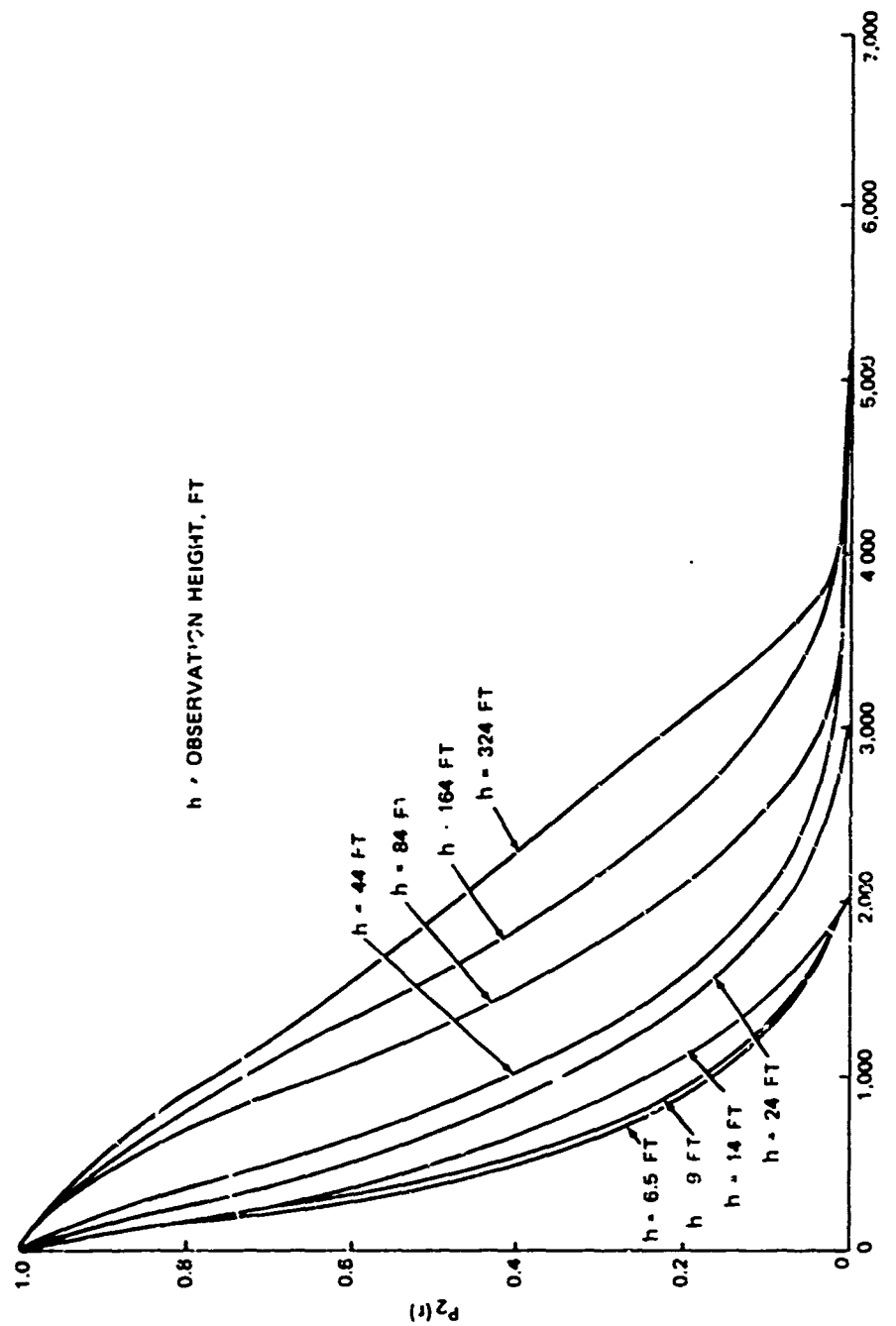
(e) Map study; rod height = 3.5 ft.

FIGURE 5. (Contd.)



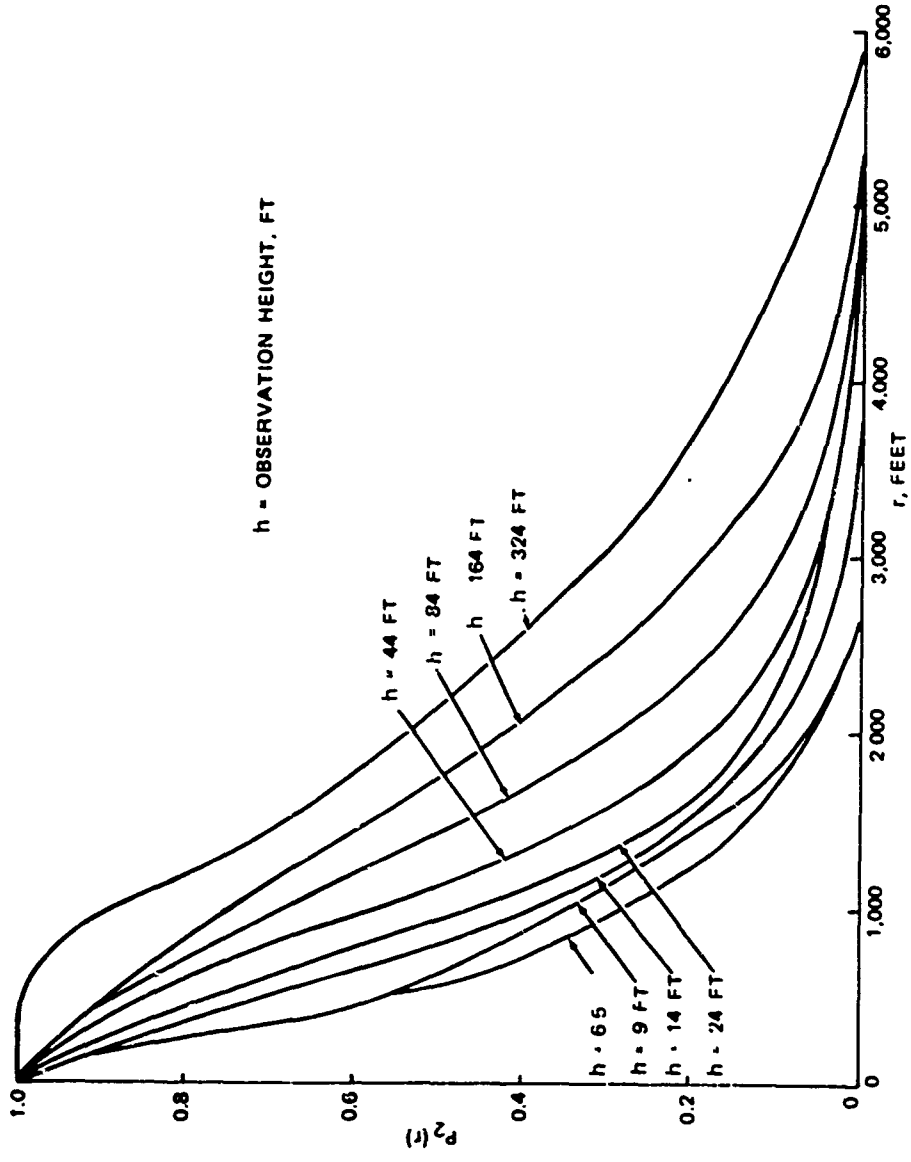
(f) Map study; rod height = 7.0 ft.

FIGURE 5. (Contd.)



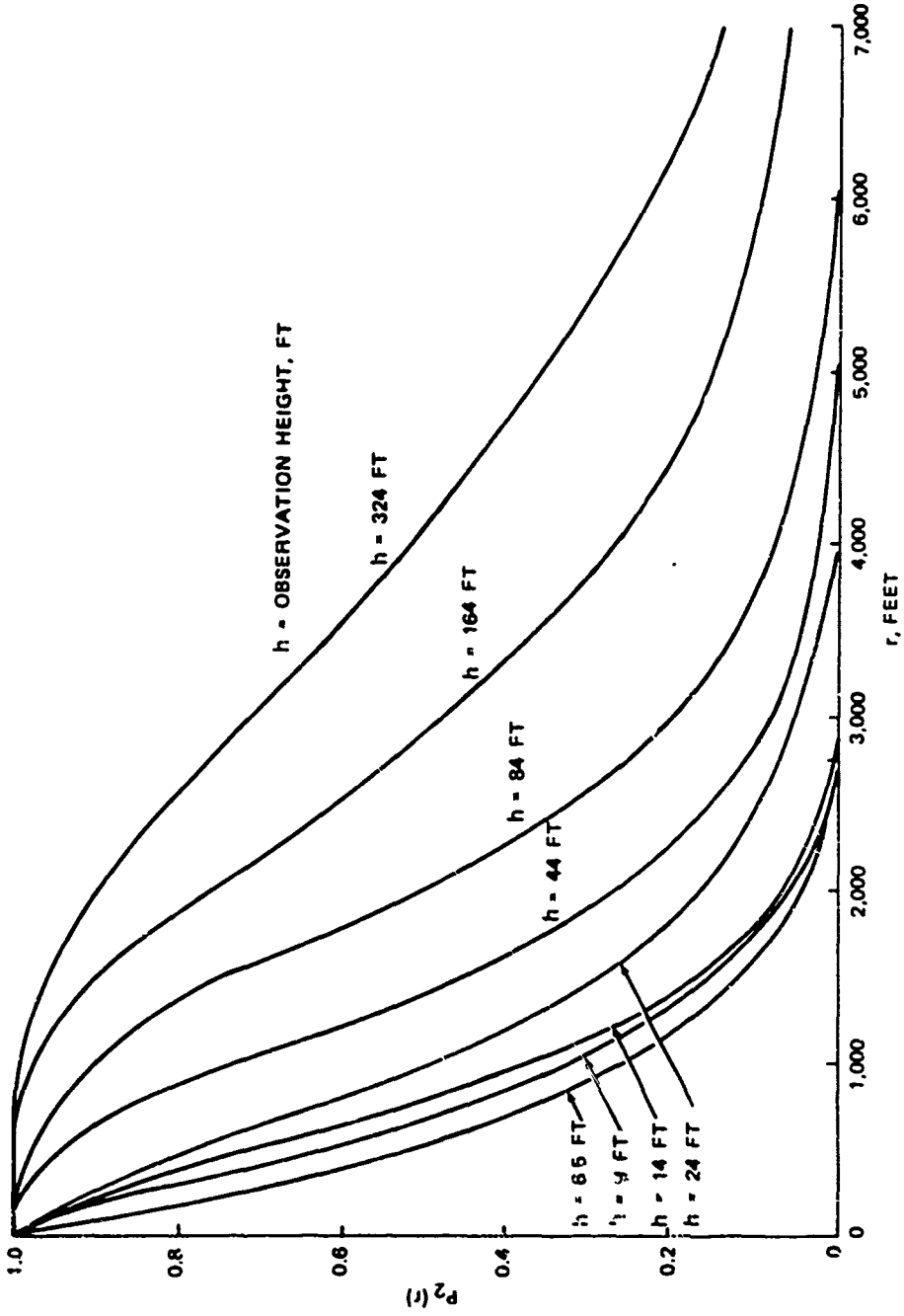
(a) Field study; foliage included; rod height = 3.5 ft.

FIGURE 6. Average Probability, $P_2(r)$, That Rod Is Exposed Throughout the Interval (0,r) Versus Distance r.



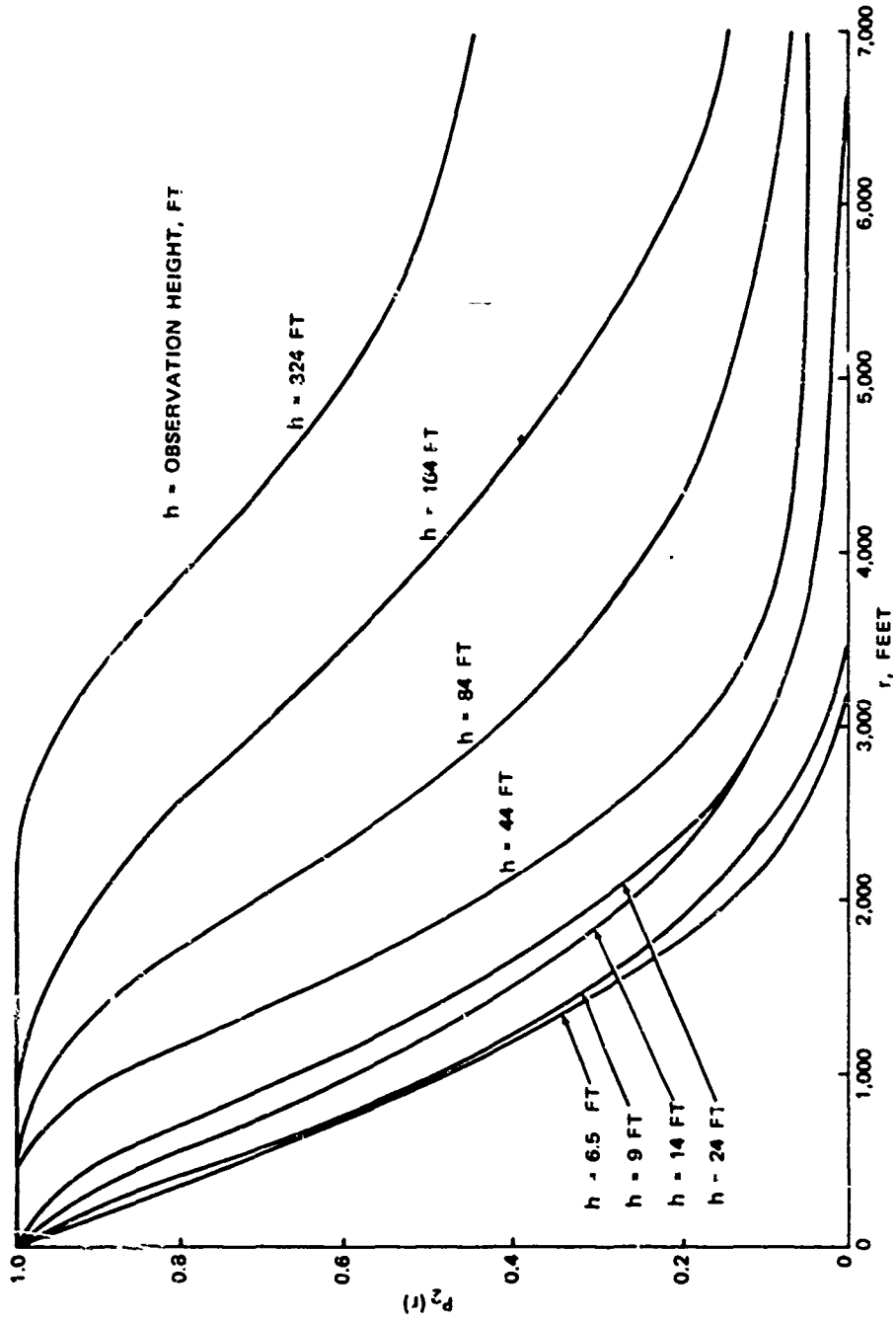
(b) Field study; foliage included; rod height = 7.0 ft.

FIGURE 6. (Contd.)



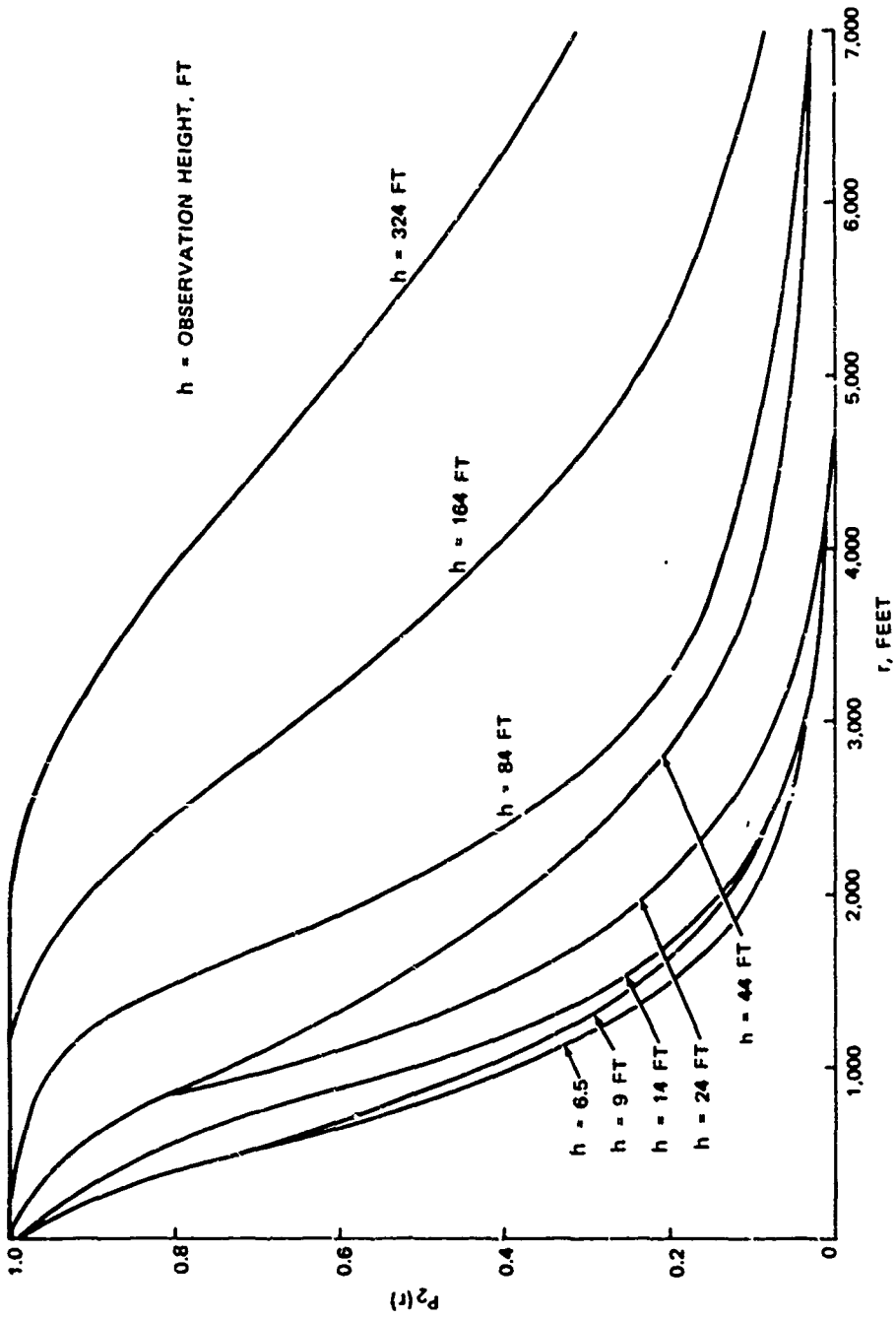
(c) Field study; foliage excluded; rod height = 3.5 ft.

FIGURE 6. (Contd.)



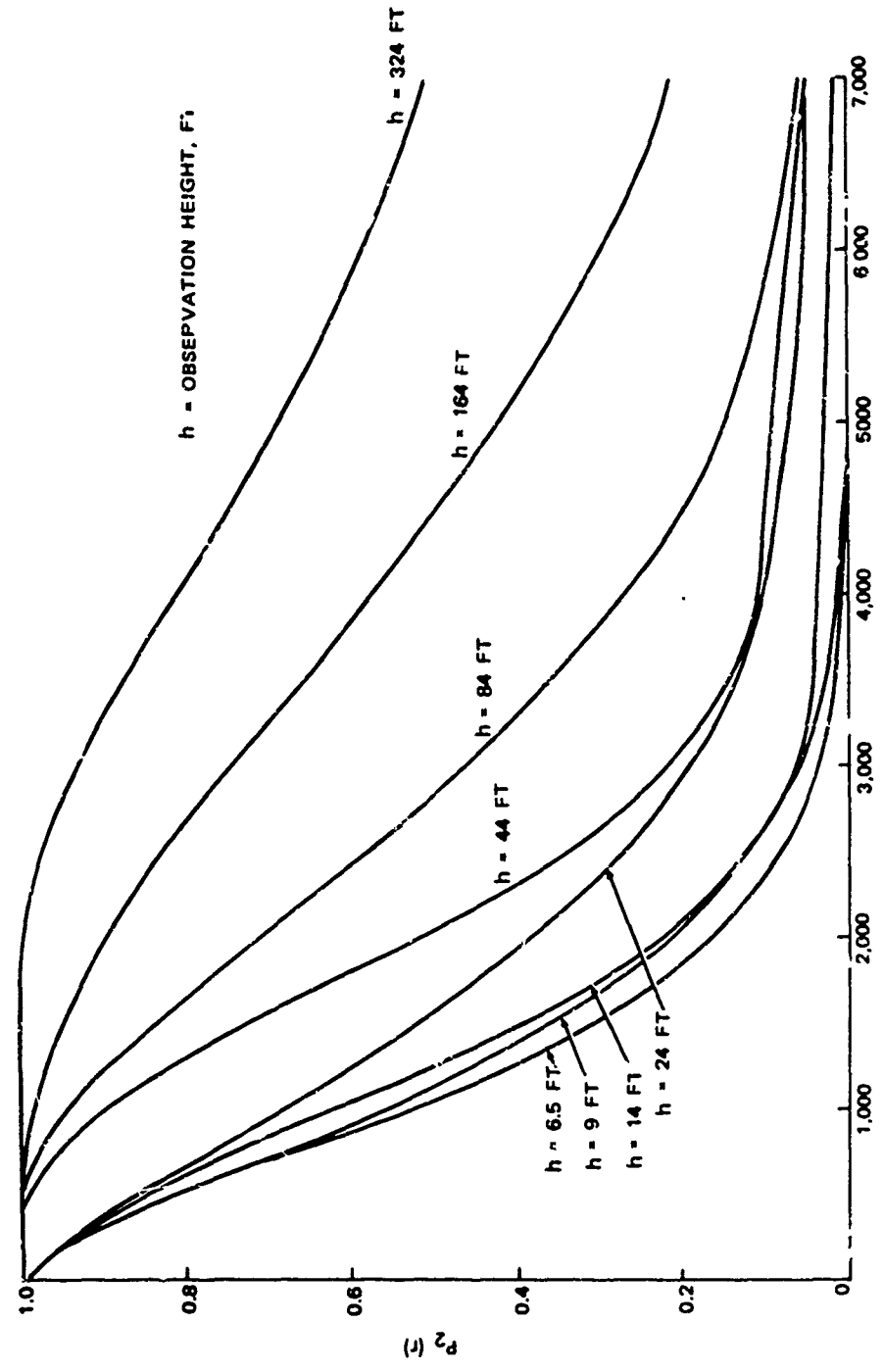
(d) Field study; foliage excluded; rod height = 7.0 ft.

FIGURE 6. (Contd.)



(e) Map study; rod height = 3.5 ft.

FIGURE 6. (Contd.)



(f) Map study; rod height = 7.0 ft.

FIGURE 6. (Contd.)

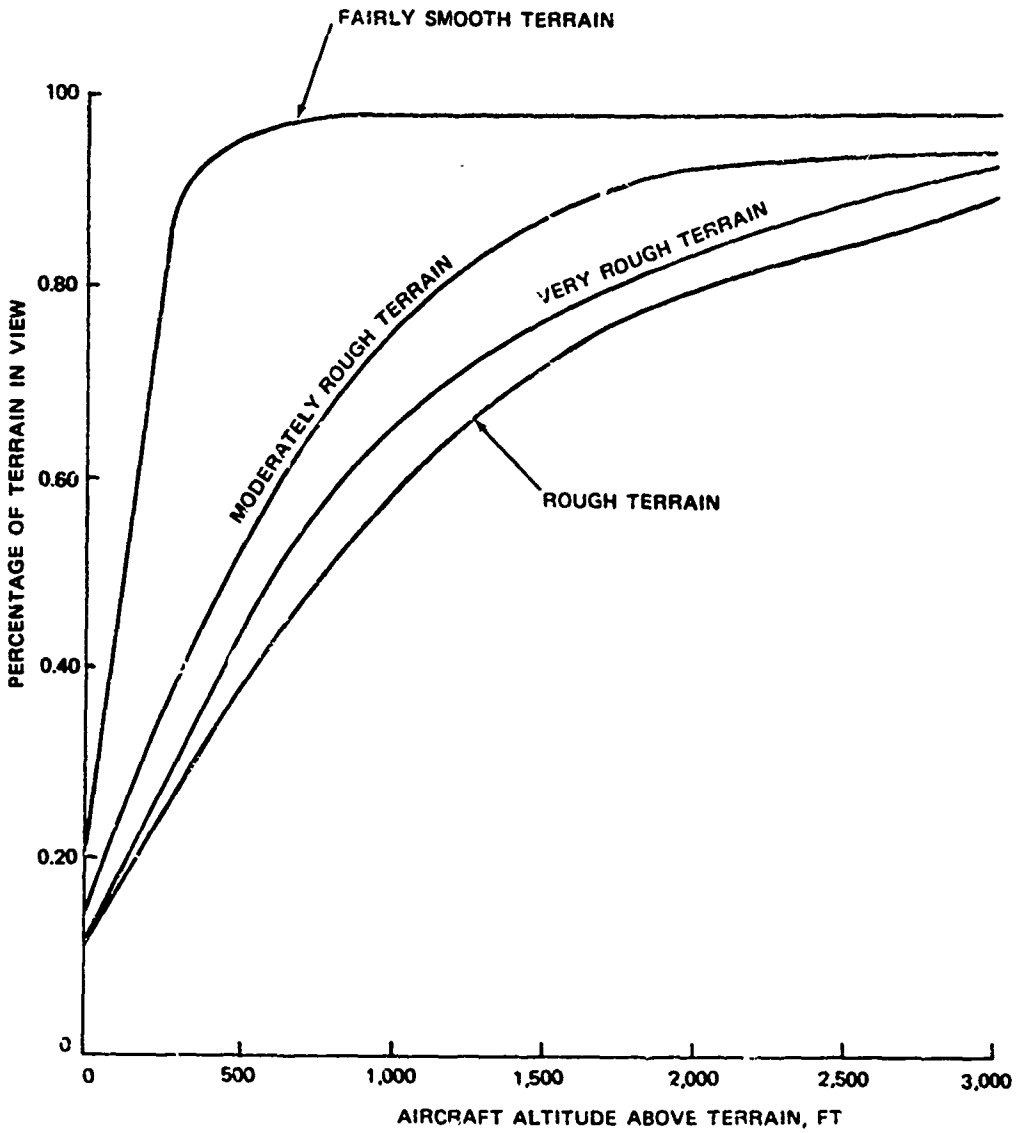
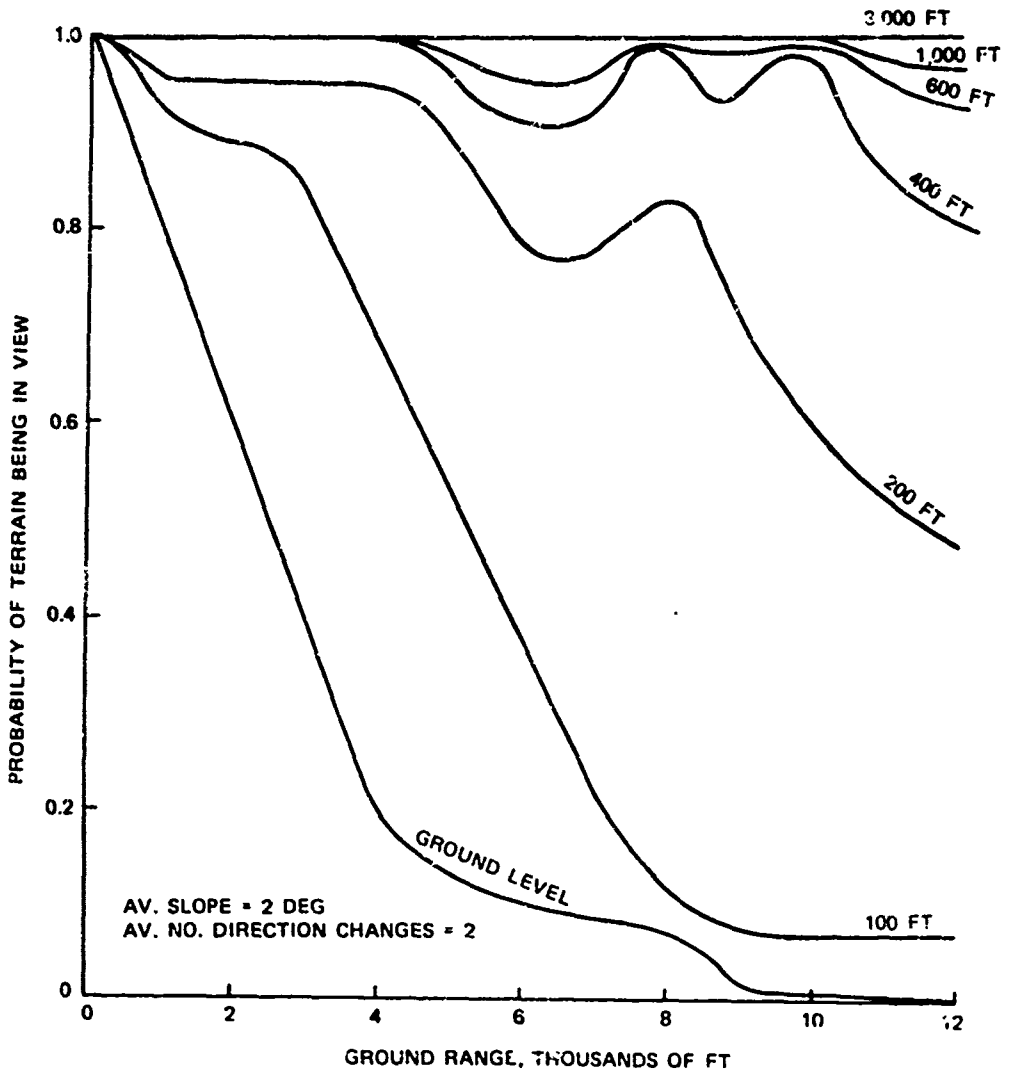
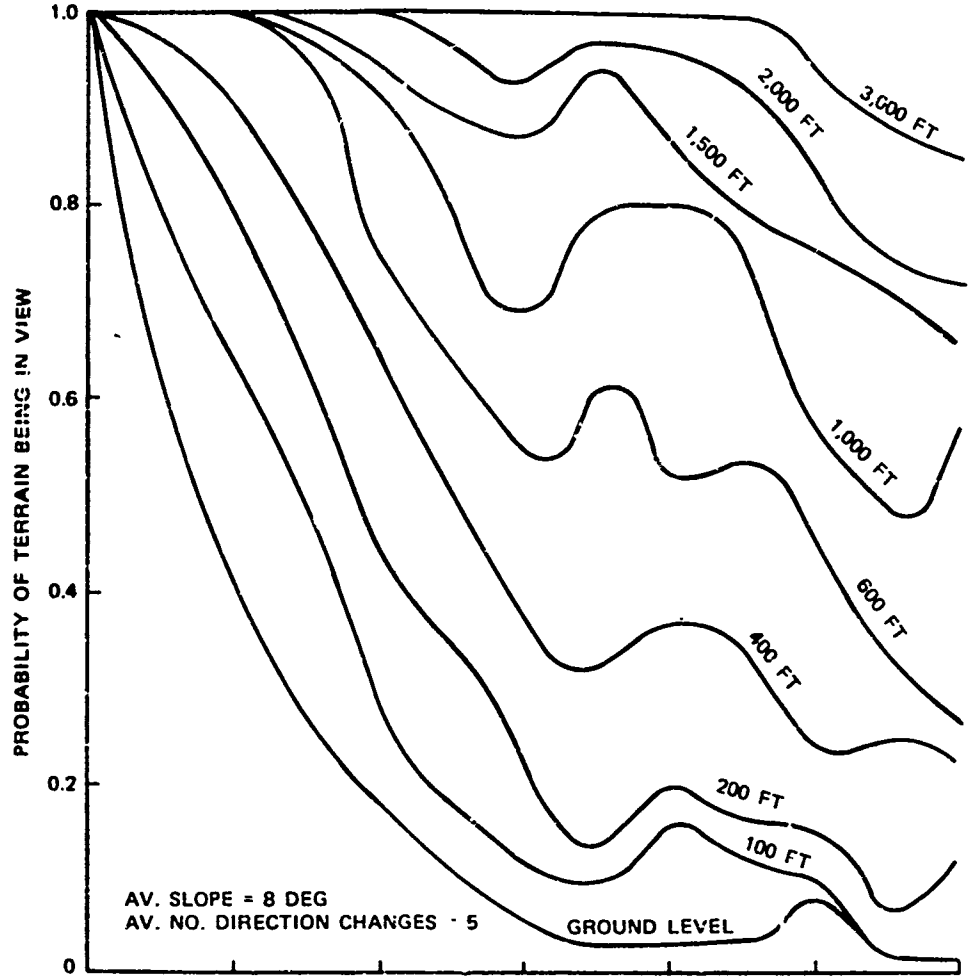


FIGURE 7. Percentage of Terrain Seen From Aircraft. These curves are based upon terrain profiles 12,000 ft in length.



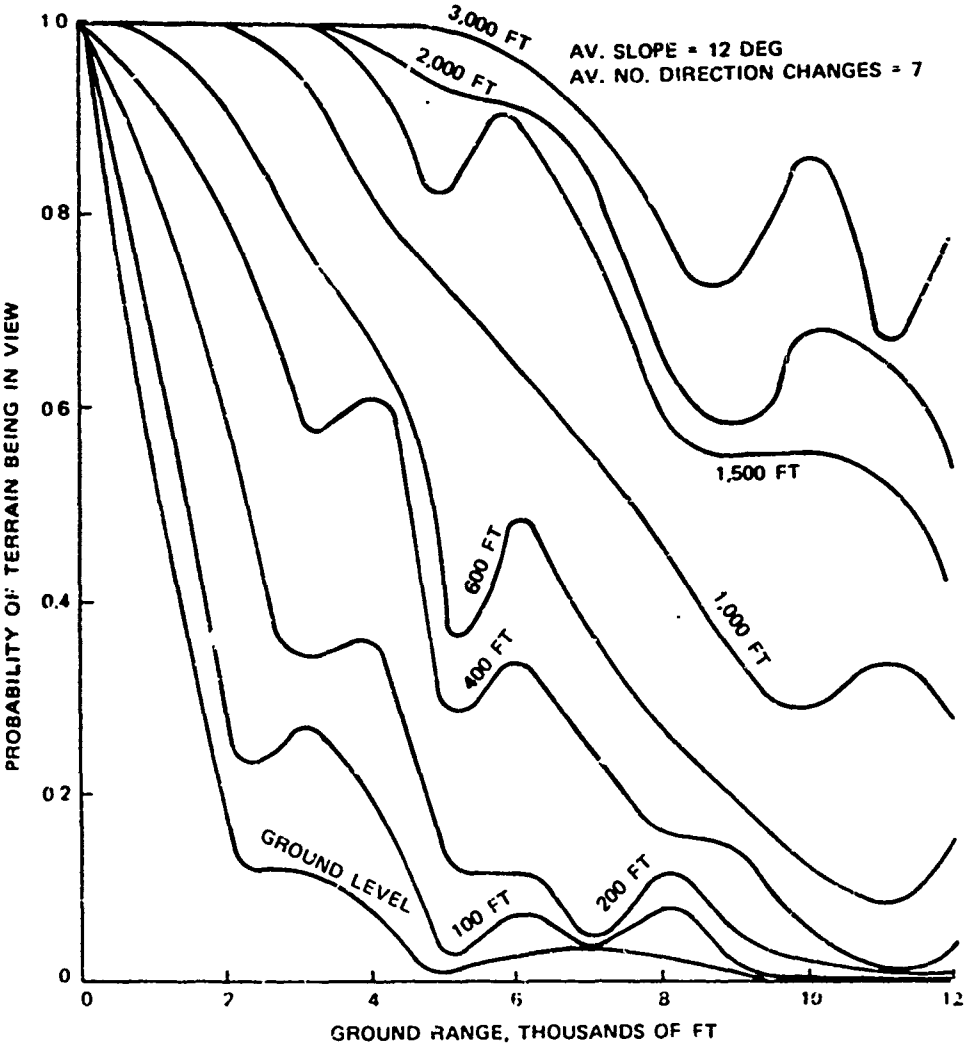
(a) Fairly smooth terrain.

FIGURE 8. Probability of the Terrain Being in View. Aircraft altitude above the terrain is shown on the curves.



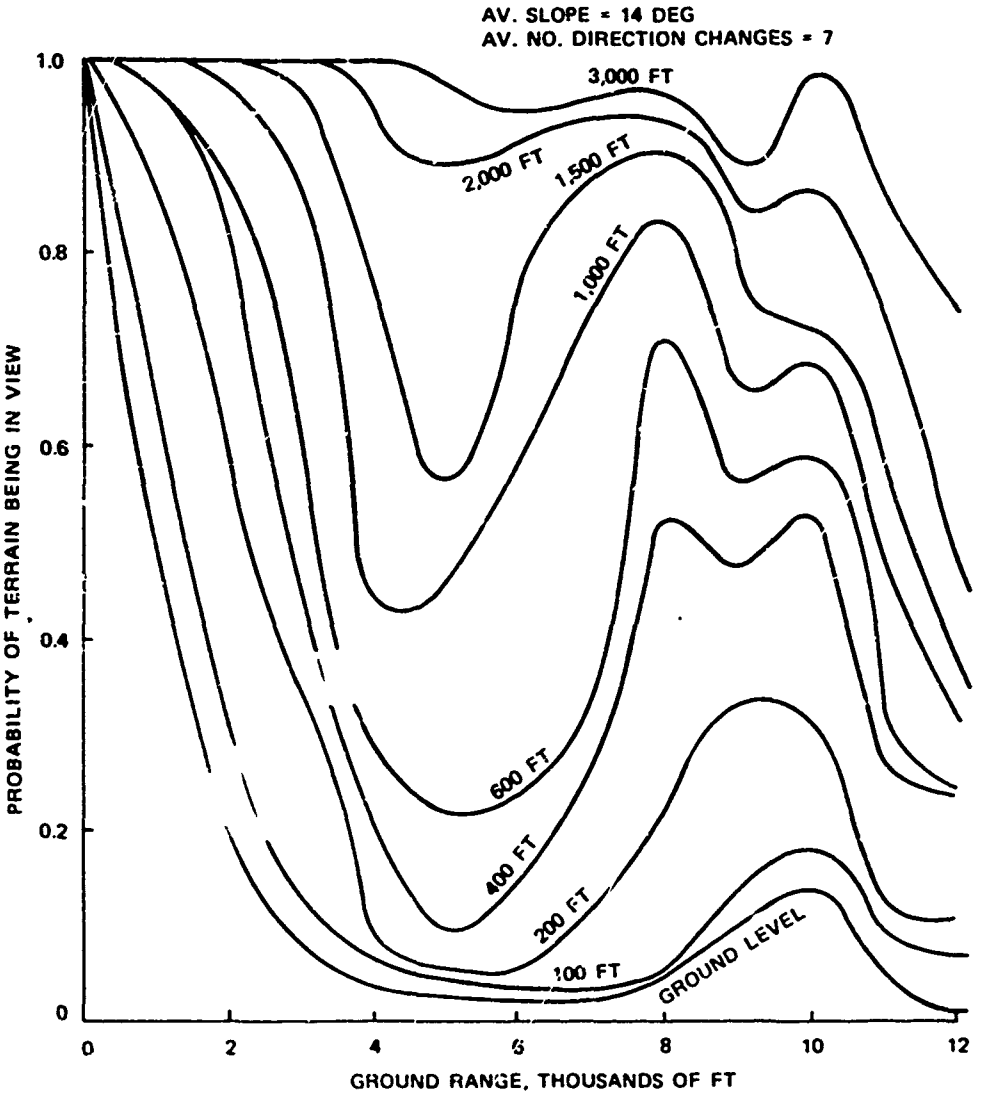
(b) Moderately rough terrain.

FIGURE 8. (Contd.)



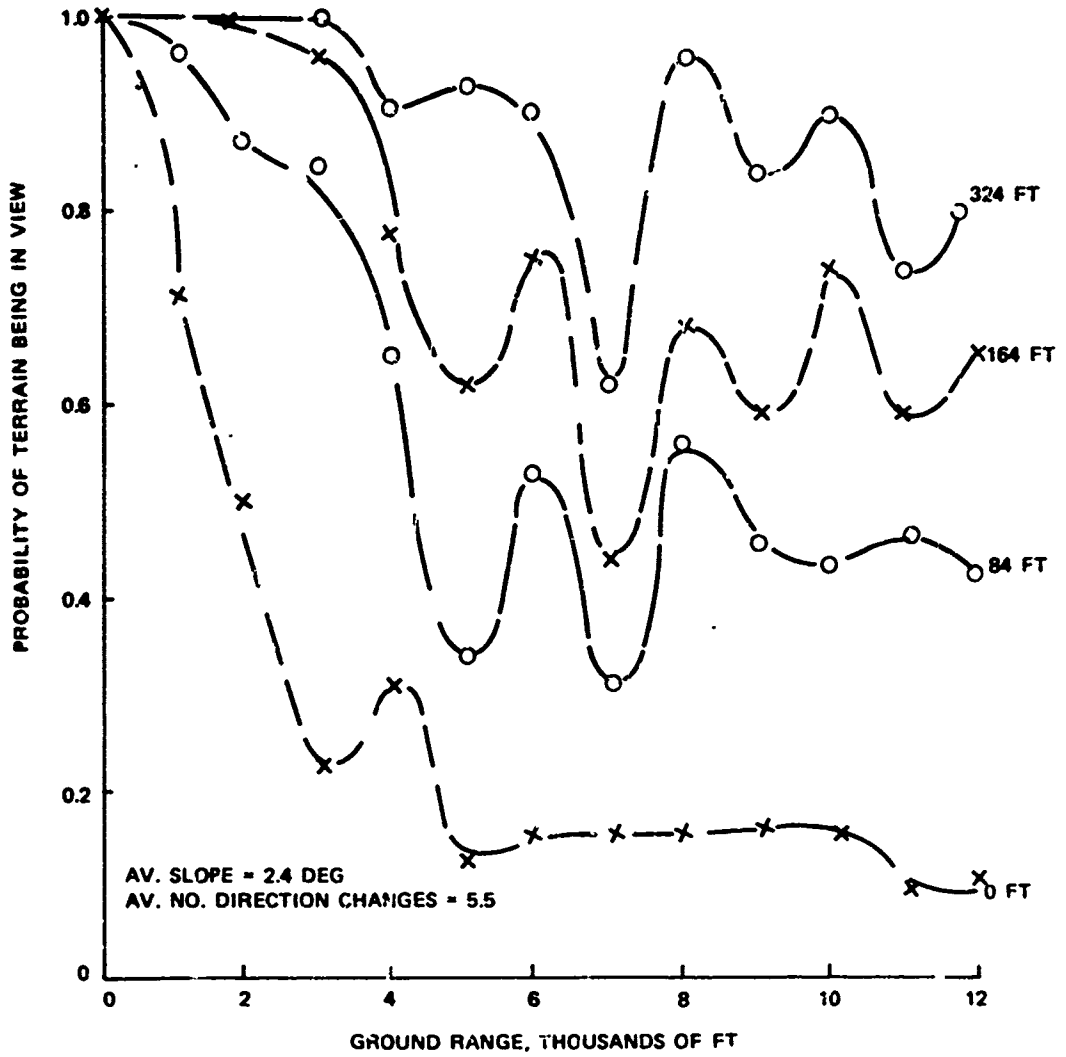
(c) Rough terrain.

FIGURE 8. (Contd.)



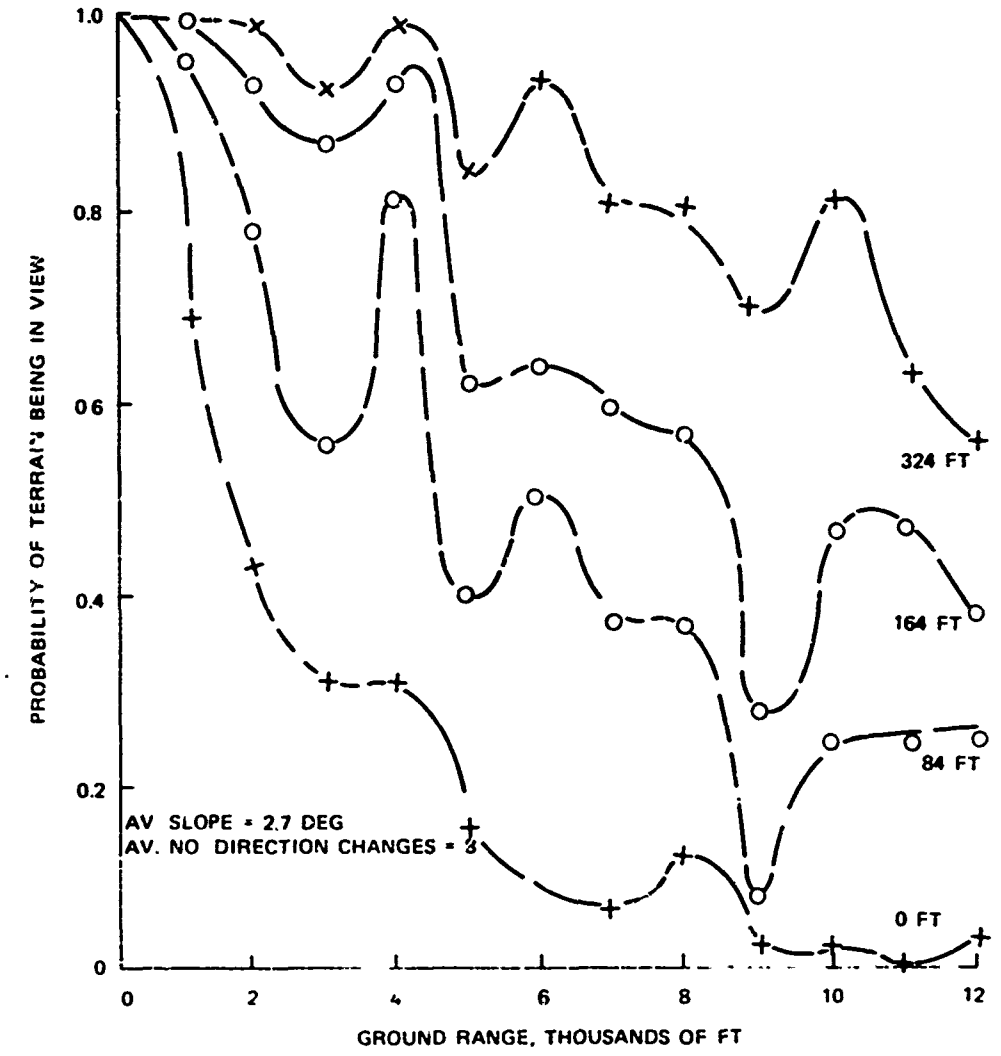
(d) Very rough terrain.

FIGURE 8. (Contd.)



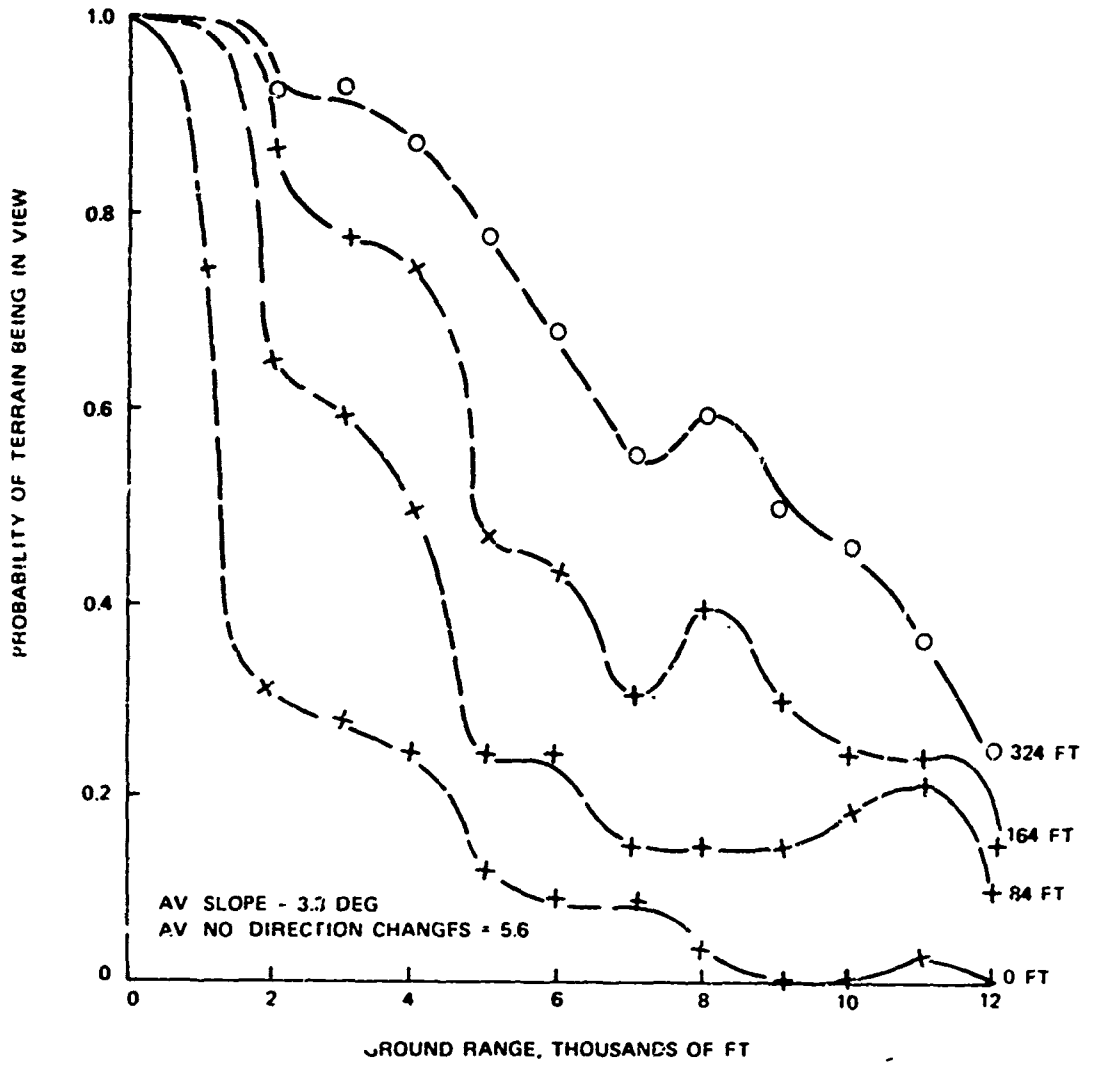
(a) Terrain Section 1.

FIGURE 9. Probability That the Ground Is Within View Versus Ground Range to Target.



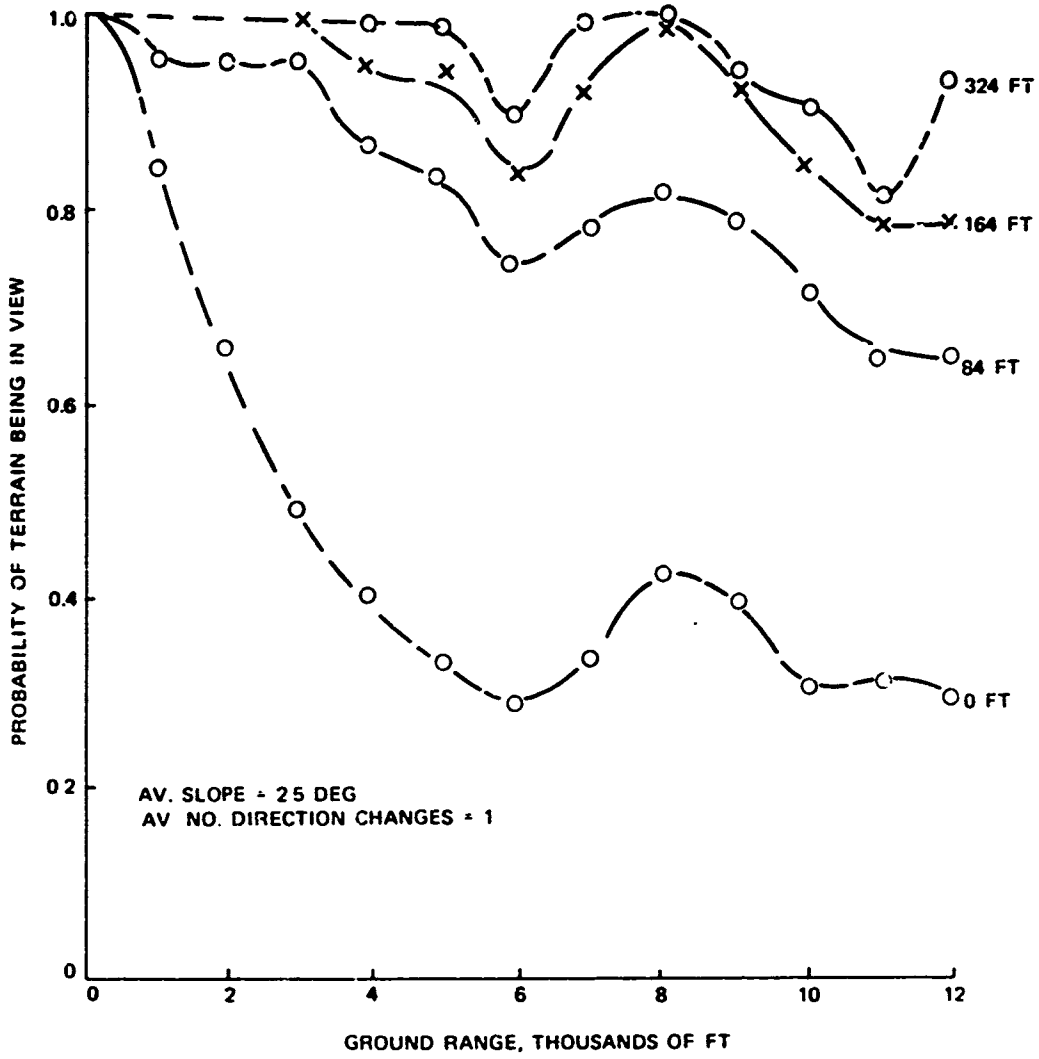
(b) Terrain Section III.

FIGURE 9. (Contd.)



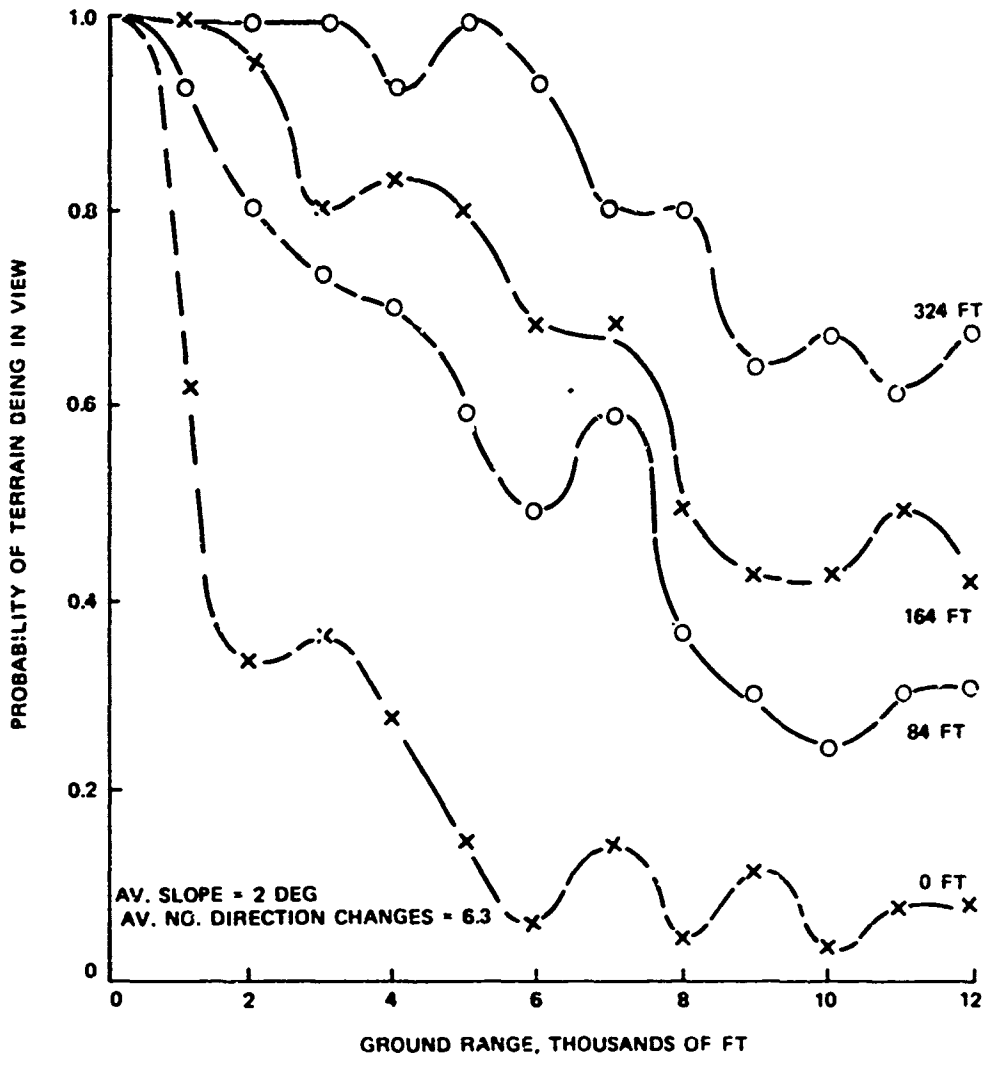
(c) Terrain Section IV.

FIGURE 9. (Contd.)



(d) Terrain Section V.

FIGURE 9. (Contd.)



(e) Terrain Section VI.

FIGURE 9. (Contd.)

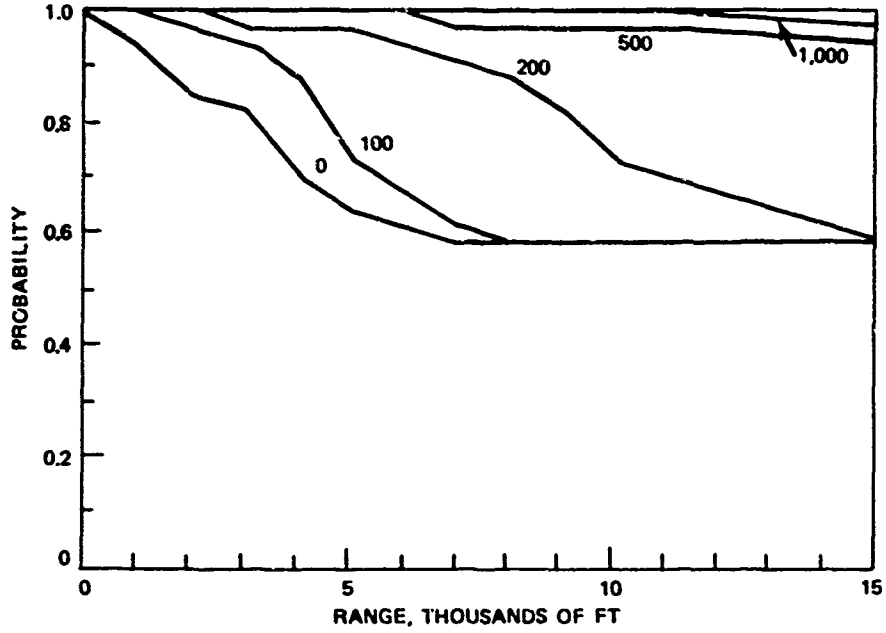
This gave them the minimum elevation angle for a clear line of sight to the target for each 10 deg of azimuth around the target. The probability of the target being unmasked at a given range and altitude was then computed by comparing points at 10-deg intervals on a circle around the target, at the given range and altitude, with the line necessary to clear the highest masking feature. From the measured JTF-2 data, Brenton[4] (see reference 4, Table 1) computed probability type 5, that a fixed target will be visible throughout 360 deg of azimuth and at range r from it. Brenton's curves for these probabilities are shown in Figures 10 and 11.

Linge[5] and Peat, Marwick, Caywood, Schiller, and Company (PMCS & Co.)[6] (see references 5 and 6, Table 1, p. 8) also compute curves for probability type 1. Linge implies that his are measured from the terrain in some manner, but does not explain how. PMCS & Co. derived the probability that a target would be in view from average terrain height, standard deviation of altitudes, and other statistical measures of the terrain. Linge's curves are shown in Figure 12 and PMCS & Co.'s in Figure 13.

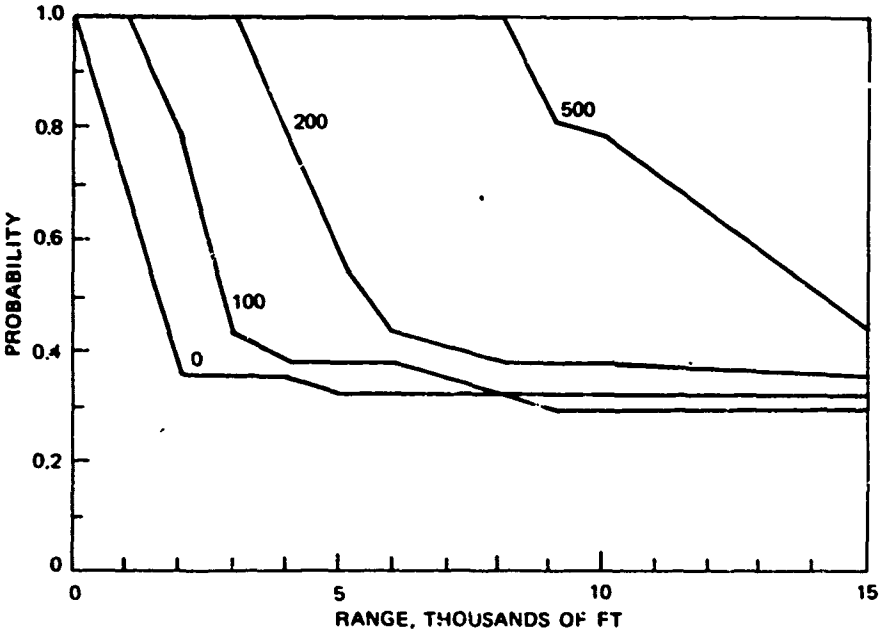
DISCUSSION OF THE DATA

The shapes of the probability curves are all roughly similar and unsurprising, the probability of unmask is 1.0 at the target and decreases as the observer moves farther away. Higher probabilities are associated with higher observer altitudes.

In order to compare the JTF-2 data with the other data in this report, the probability curves for six of the JTF-2 targets (Figures 10a-10f) were combined and plotted in Figure 14. Each point on these curves represents 216 data points. The six targets were chosen because they were judged to all be located in fairly similar terrain--which, on Erickson's scale, would probably be called "quite smooth." The distribution of targets and the number of different sections of terrain is unknown. The average slope of the terrain is 0.9 and the average number of slope direction changes is 1.7. These roughness characteristics were measured on 40-ft-contour-interval topographic maps. Figure 15 was drawn to compare the appropriate data from different studies. It shows the probability of target exposure at r from an observation height of 100 or 84 ft as computed by BRL, Brenton (JTF-2), Erickson, and Gill. These curves all represent fairly smooth terrain, those in (a) with foliage and those in (b) without foliage.

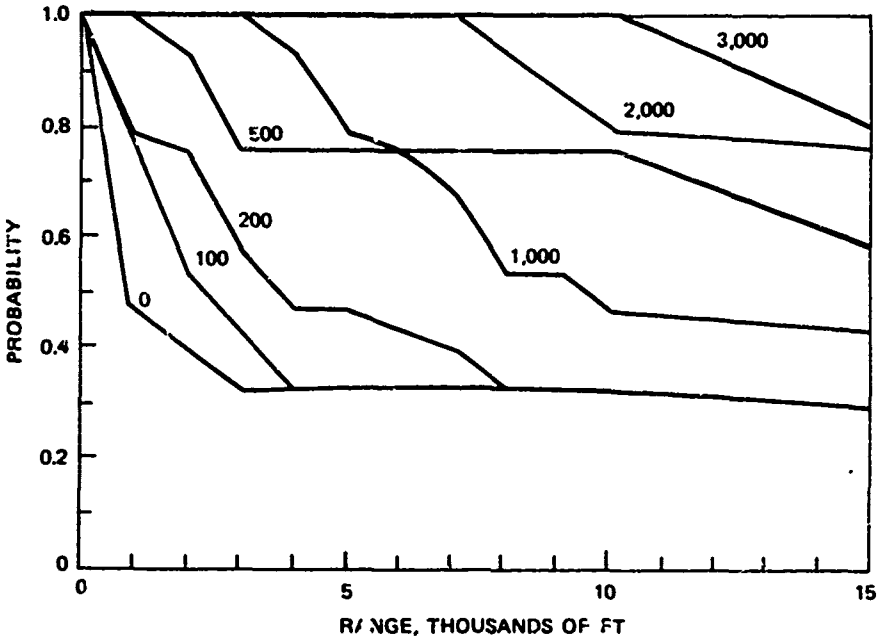


(a) Target E3; slope = 0.5 deg; slope change = 0.9.

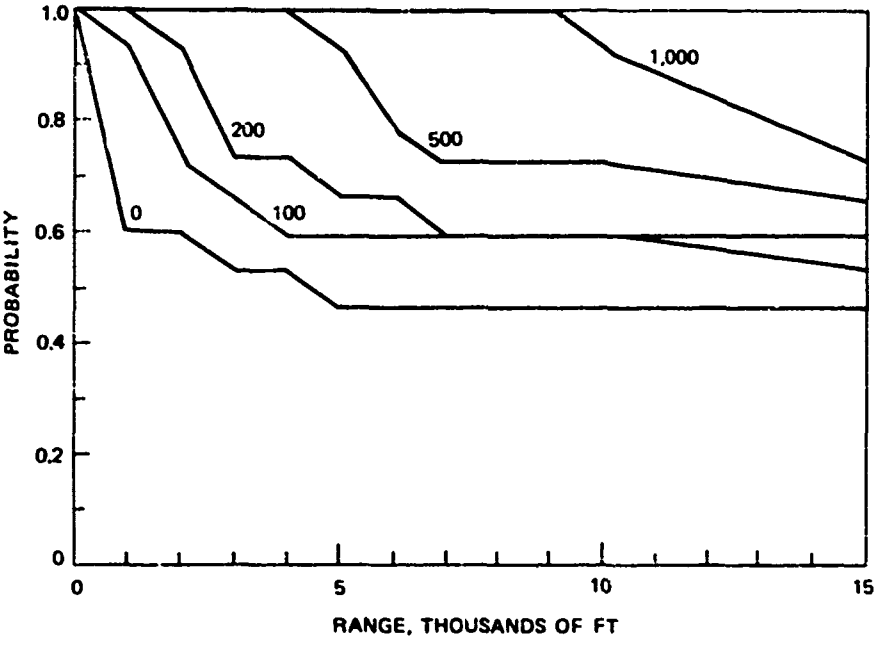


(b) Target W1; slope = 0.6 deg; slope change = 1.1.

FIGURE 10. Probability of Target Center in View, JTF-2 Test 4.1. Observation height in feet shown on curves.

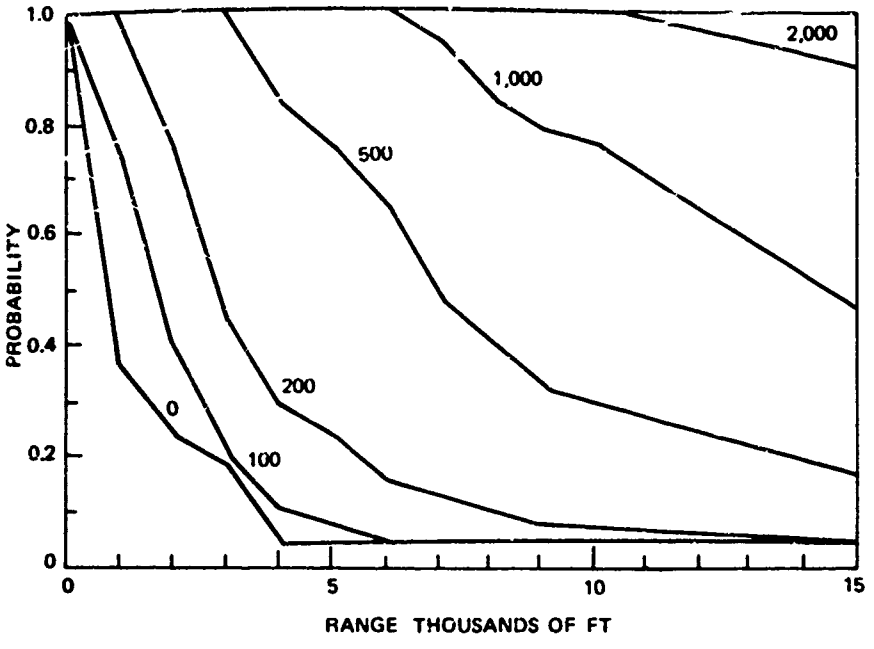


(c) Target E2; slope = 0.9 deg; slope change = 1.6.

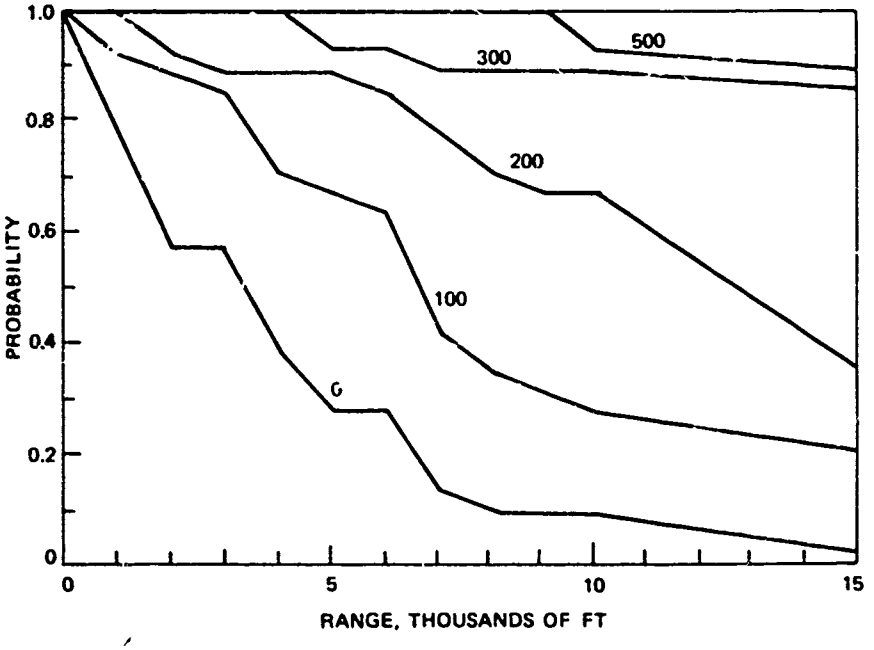


(d) Target W2; slope = 1.0 deg; slope change = 2.2.

FIGURE 10. (Contd.)

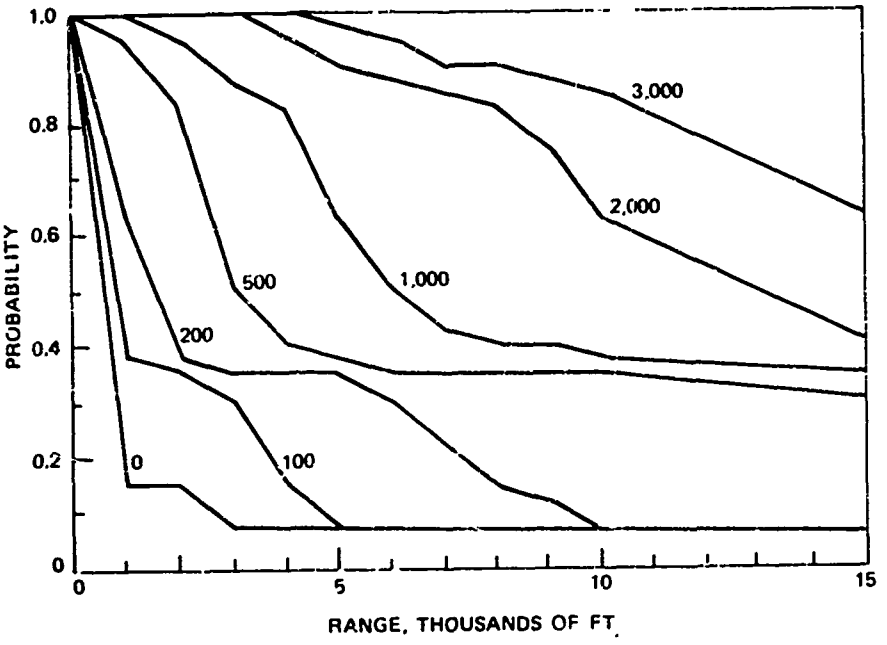


(e) Target W3; slope = 1.1 deg; slope change = 1.7.

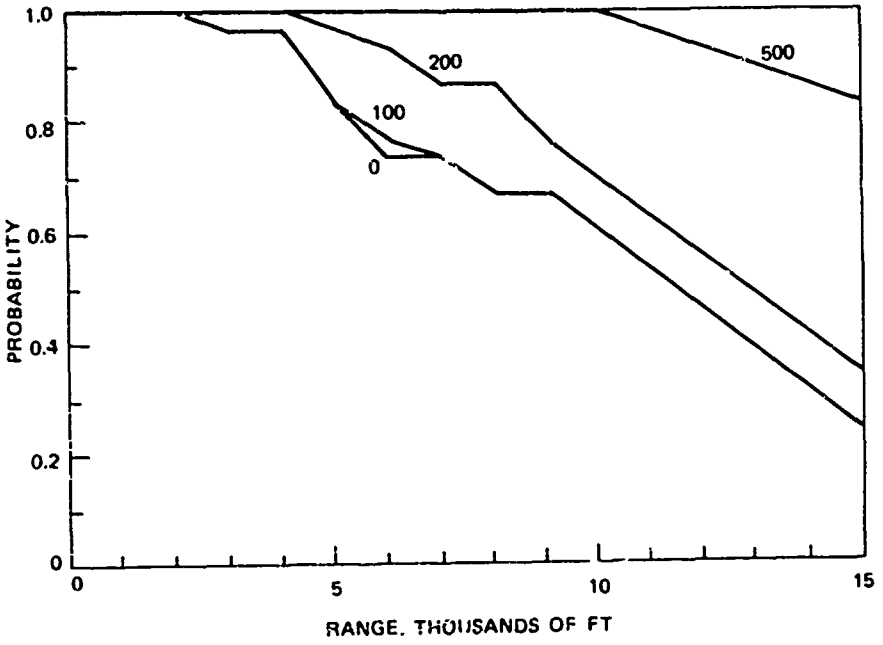


(f) Target W4; slope = 1.2 deg; slope change = 2.6.

FIGURE 10. (Contd.)

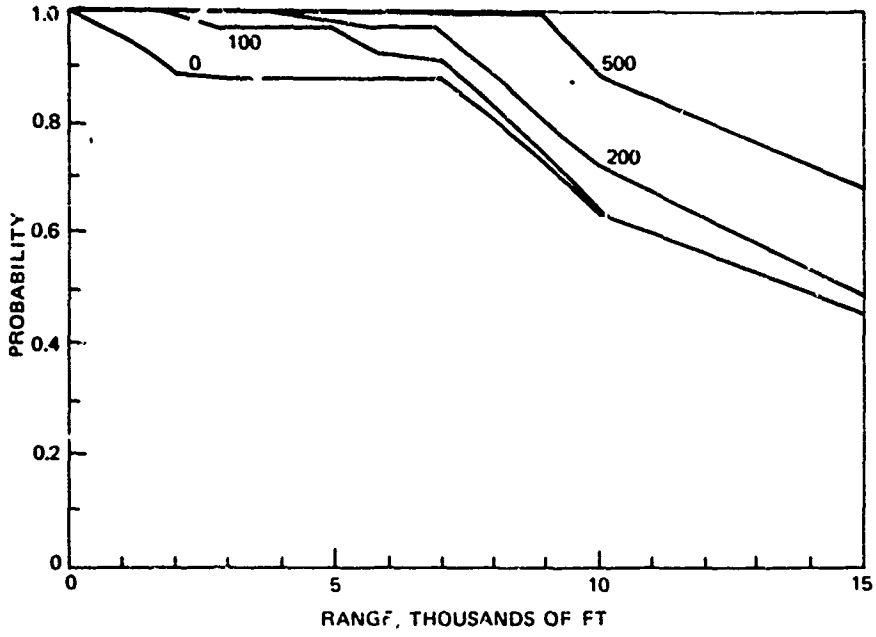


(g) Target W4; slope = 1.8 deg; slope change = 2.6.

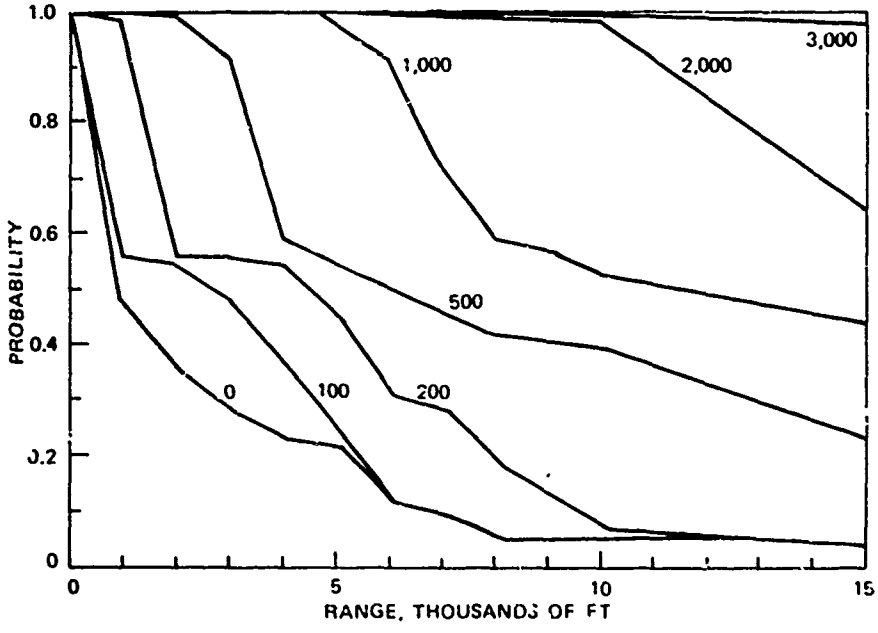


(h) Target E4; slope = 2.7 deg; slope change = 4.9.

FIGURE 10. (Contd.)

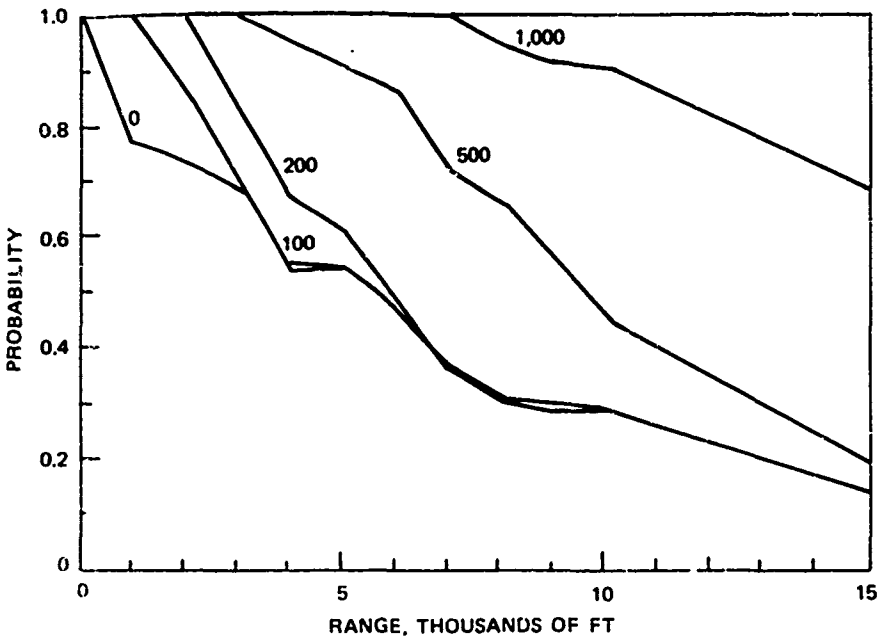


(a) Target 15; slope = 0.5 deg; slope change = 0.1.

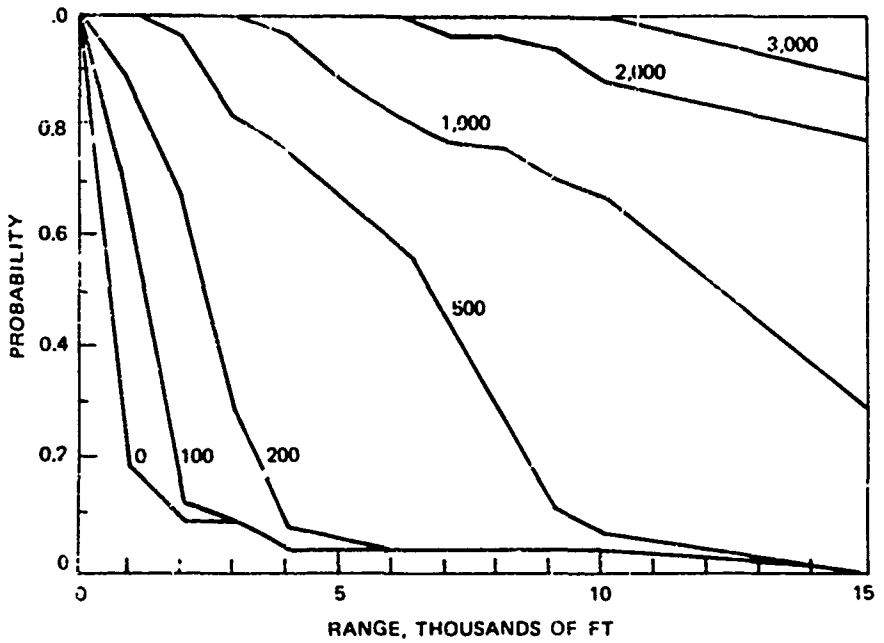


(b) Target 1; slope = 0.7 deg; slope change = 0.

FIGURE 11. Probability of Target Center in View, JTF-2 Test 4.4. Observation height in feet shown on curves.

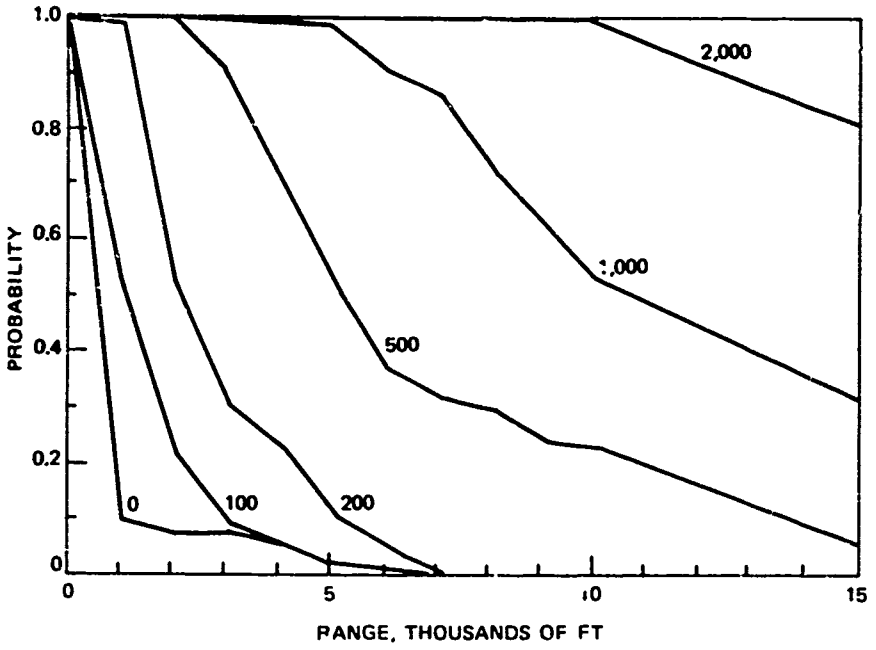


(c) Target 12; slope = 0.8 deg; slope change = 0.2.

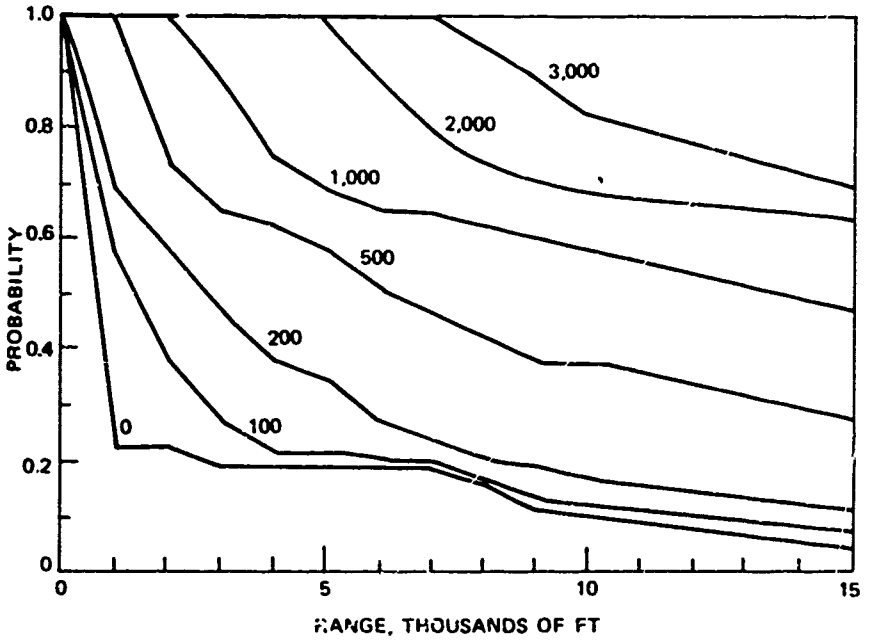


(d) Target 20; slope = 1.3 deg; slope change = 0.3.

FIGURE 11. (Contd.)

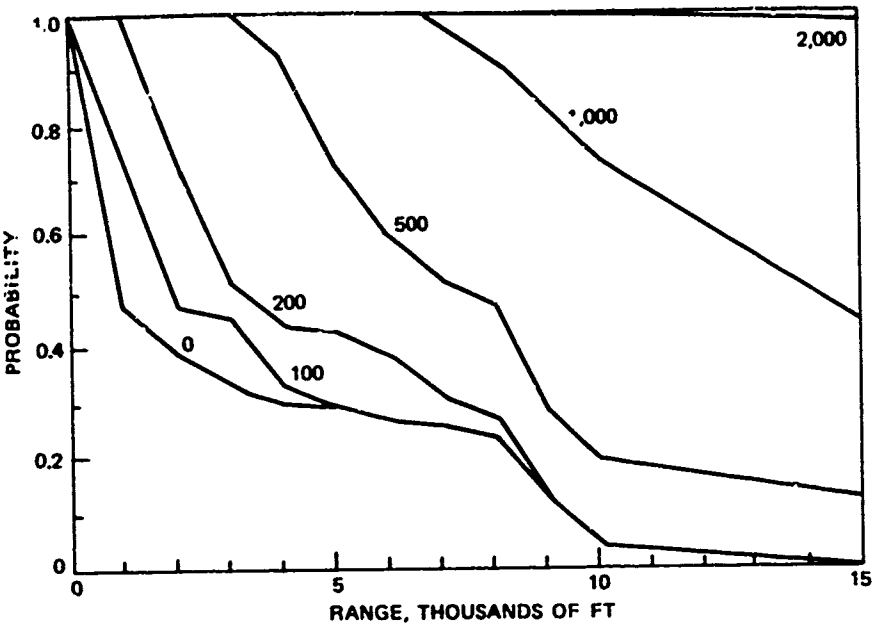


(e) Target 18; slope = 1.4 deg; slope change = 1.1.

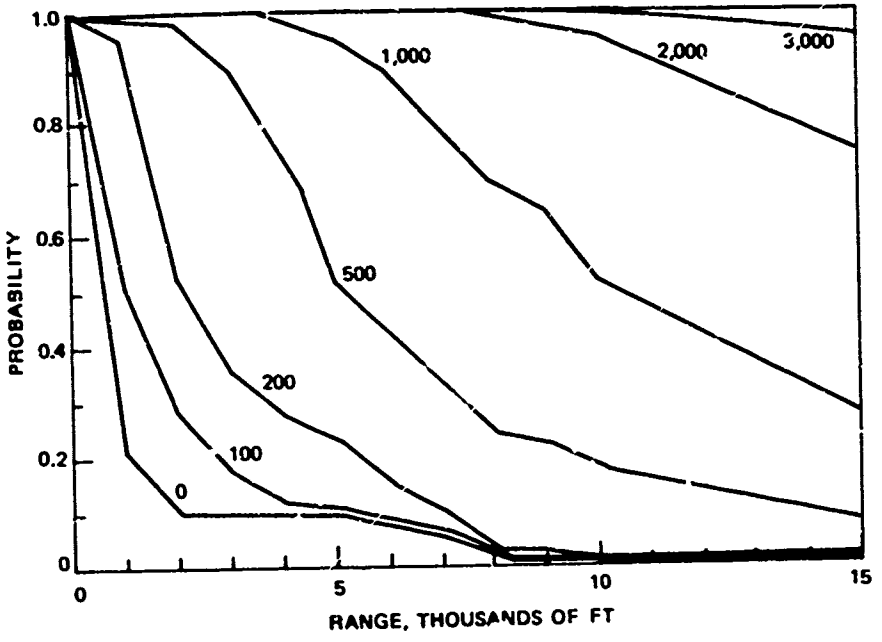


(f) Target 23; slope = 1.5 deg; slope change = 1.4.

FIGURE 11. (Contd.)

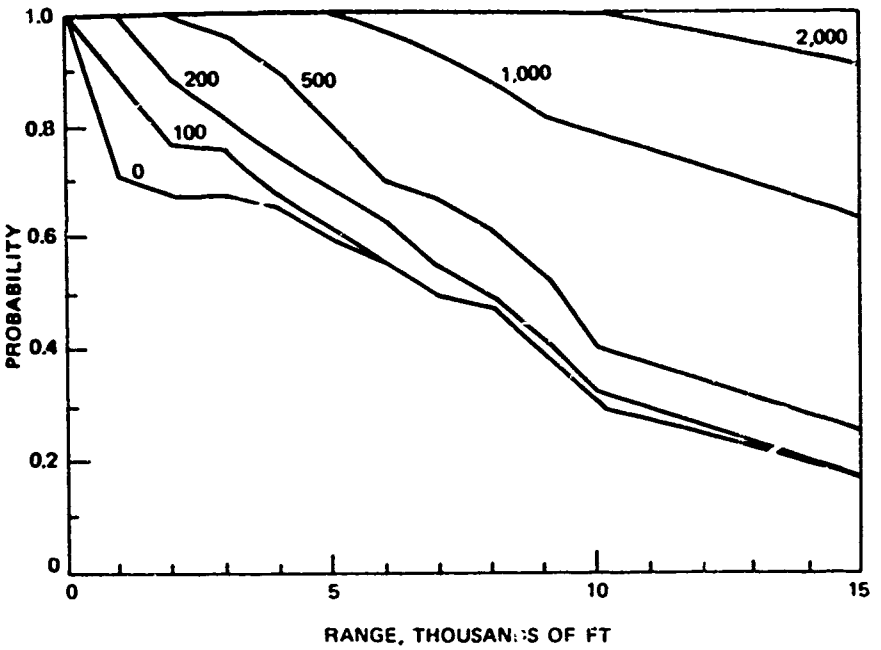


(g) Target 4; slope = 1.6 deg; slope change = 0.8.

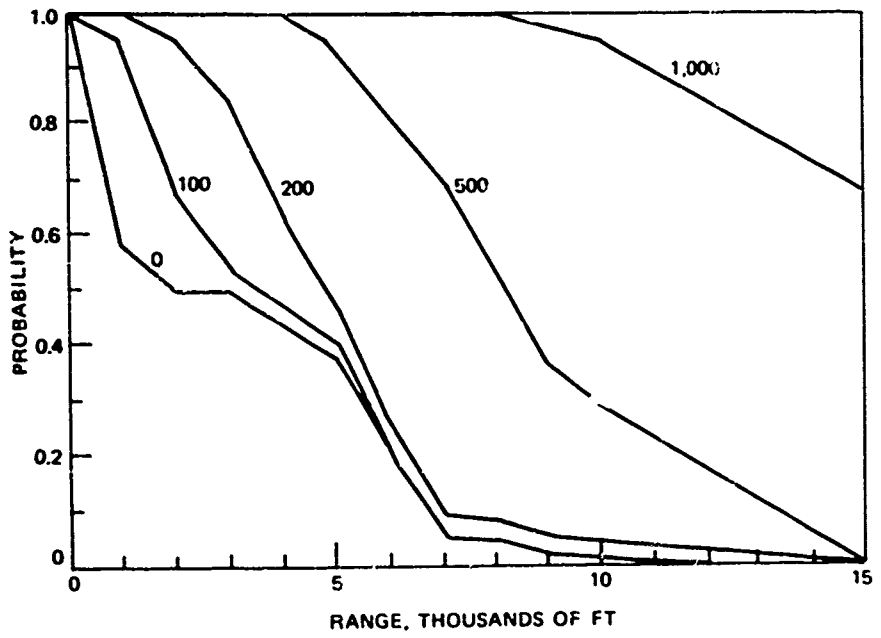


(h) Target 11; slope = 2.1 deg; slope change = 0.9.

FIGURE 11. (Contd.)

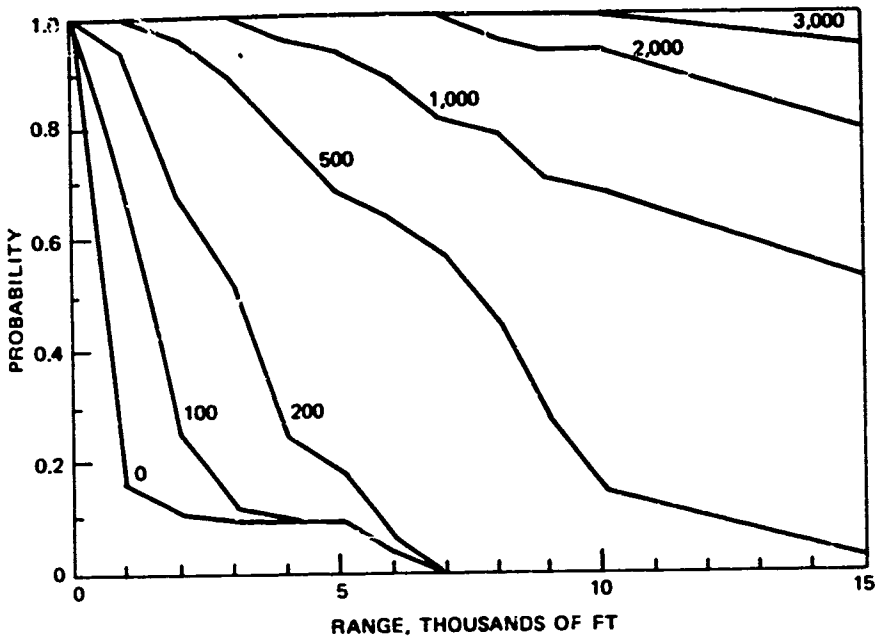


(i) Target 10; slope = 2.2 deg; slope change = 1.0.

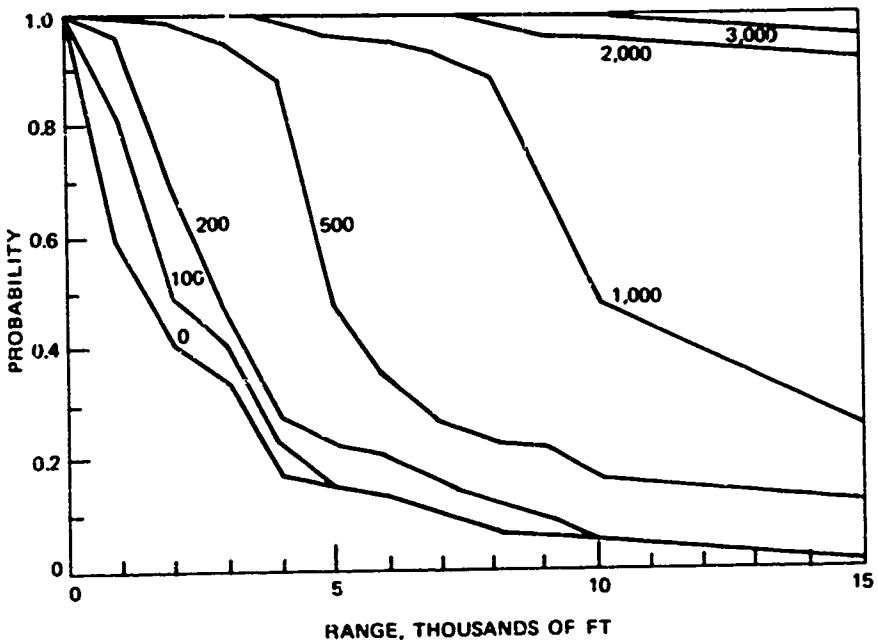


(j) Target 5; slope = 1 4 deg; slope change = 1.0.

FIGURE 11. (Contd.)

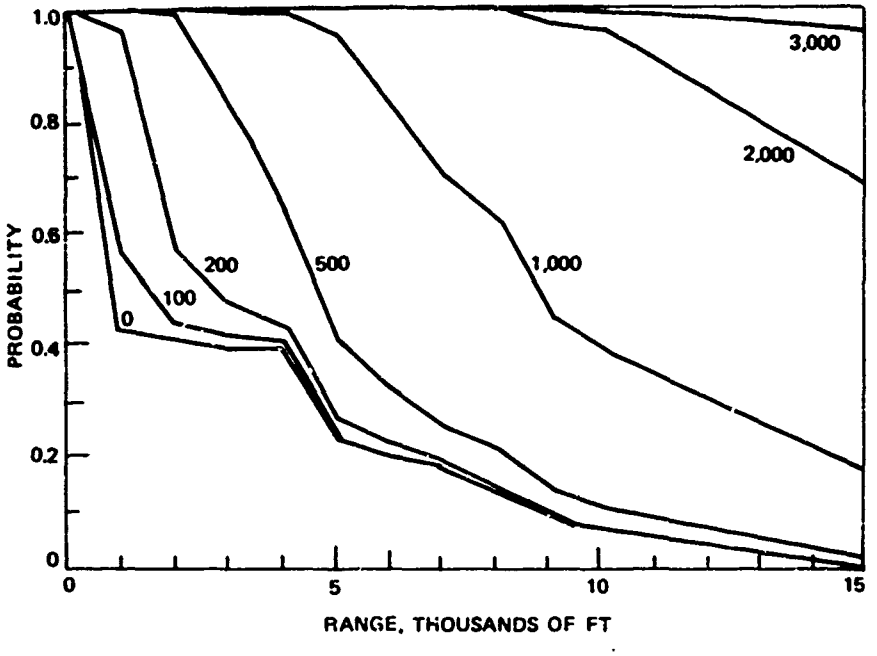


(k) Target 6; slope = 1.6 deg; slope change = 1.9.

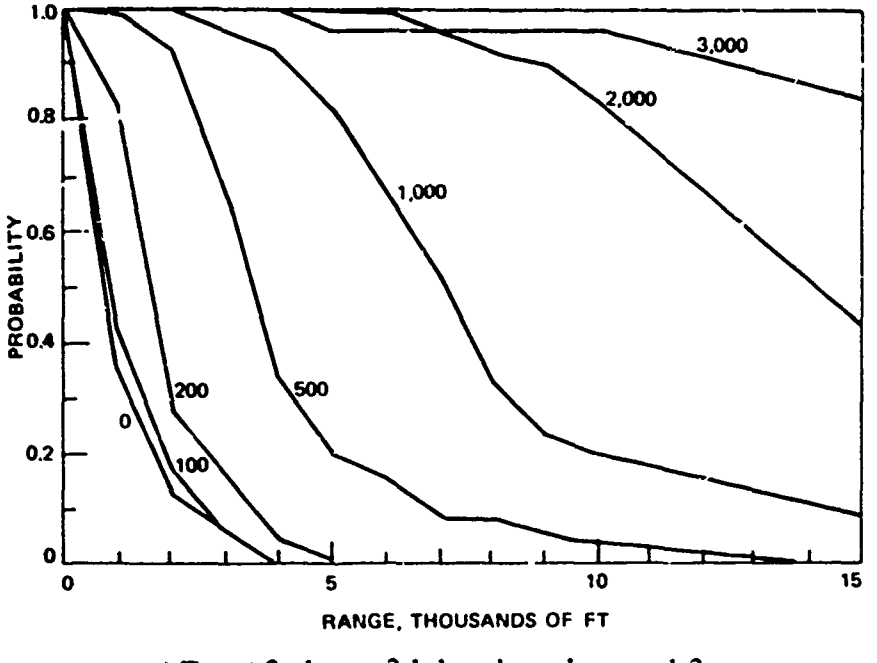


(l) Target 16; slope = 2.7 deg; slope change = 2.1.

FIGURE 11. (Contd.)

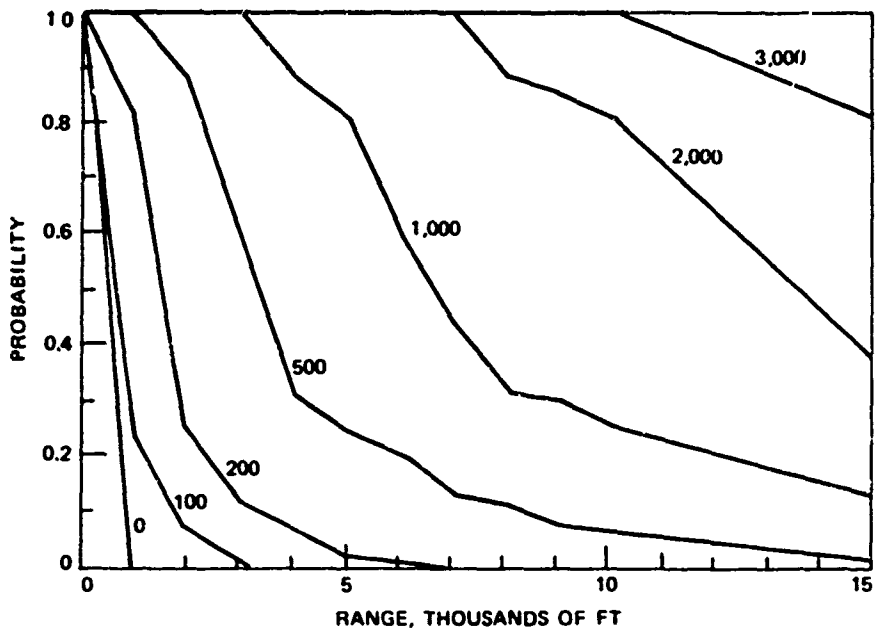


(m) Target 19; slope = 2.8 deg; slope change = 1.5.

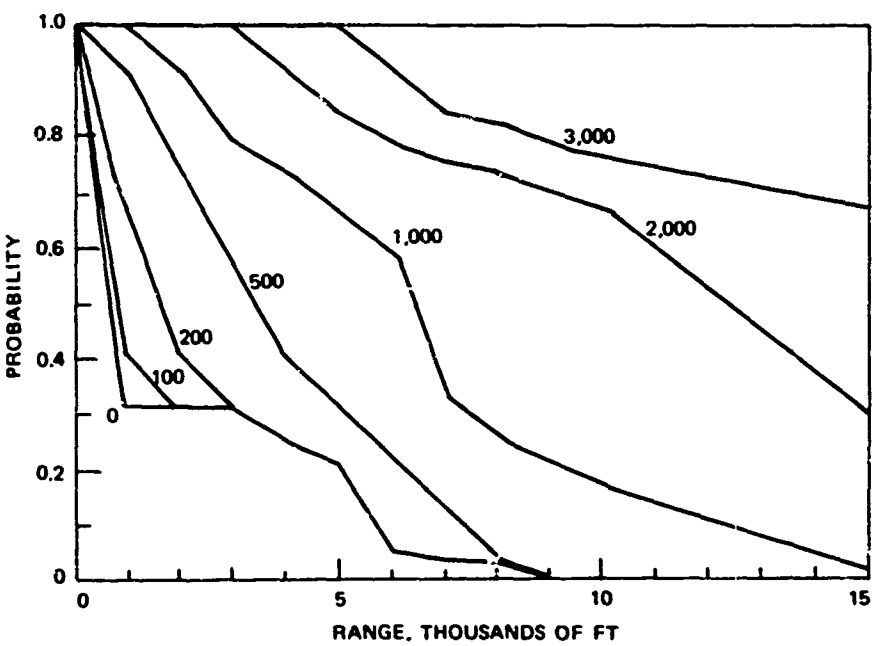


(n) Target 2; slope = 3.1 deg; slope change = 1.2.

FIGURE 11. (Contd.)



(o) Target 7; slope = 3.8 deg; slope change = 2.0.



(p) Target 8; slope = 5.3 deg; slope change = 2.2.

FIGURE 11. (Contd.)

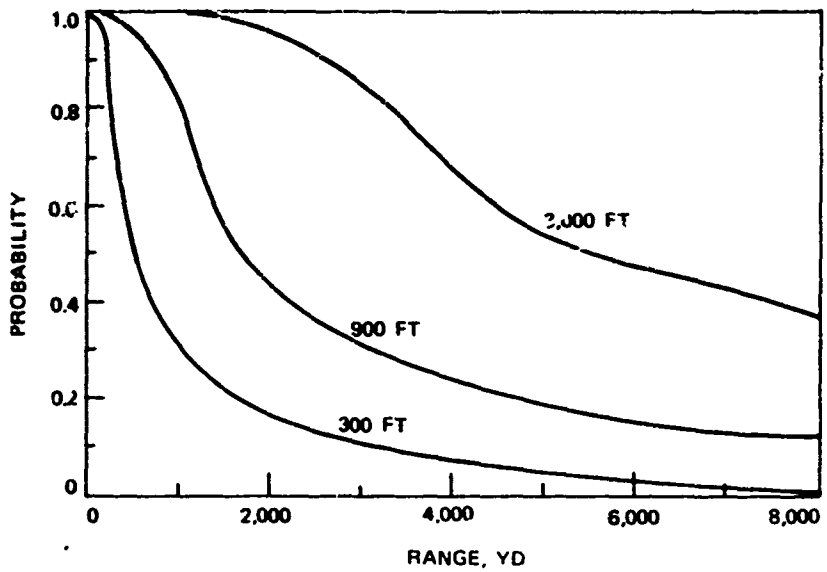


FIGURE 12. Probability of Target in View, Linge, Mid-Western Terrain.

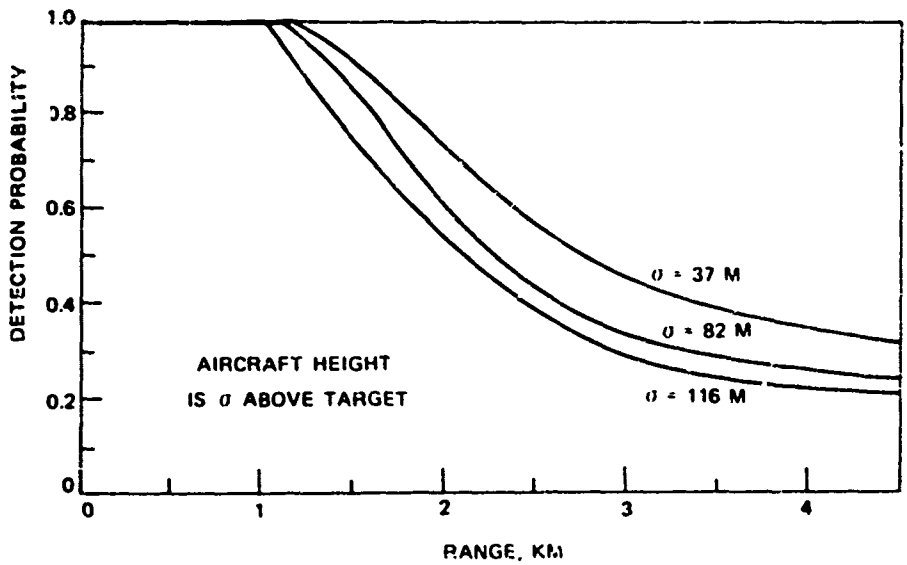


FIGURE 13. Probability of Target in View in Three Terrain Types. Sigma is the standard deviation of each type of terrain.

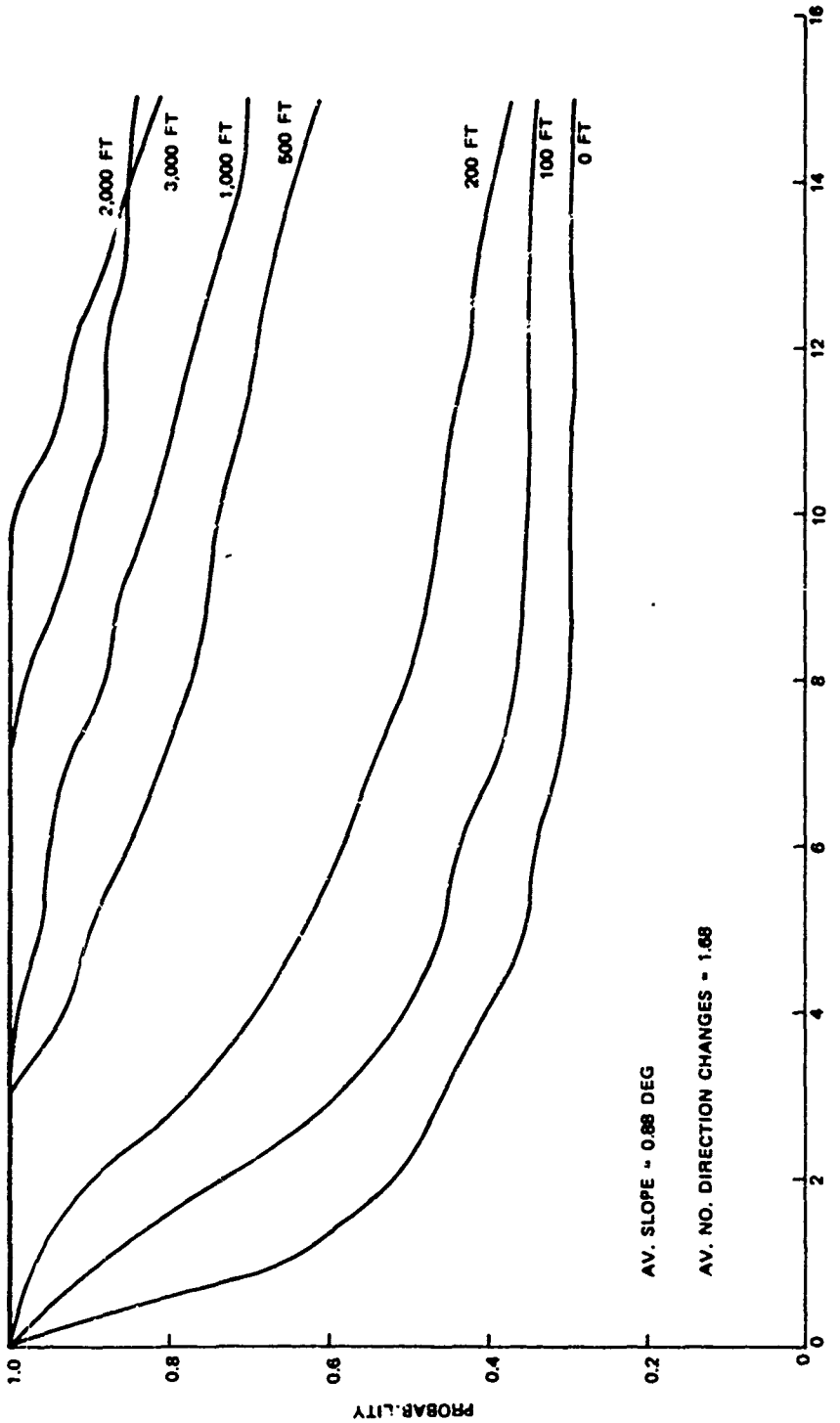
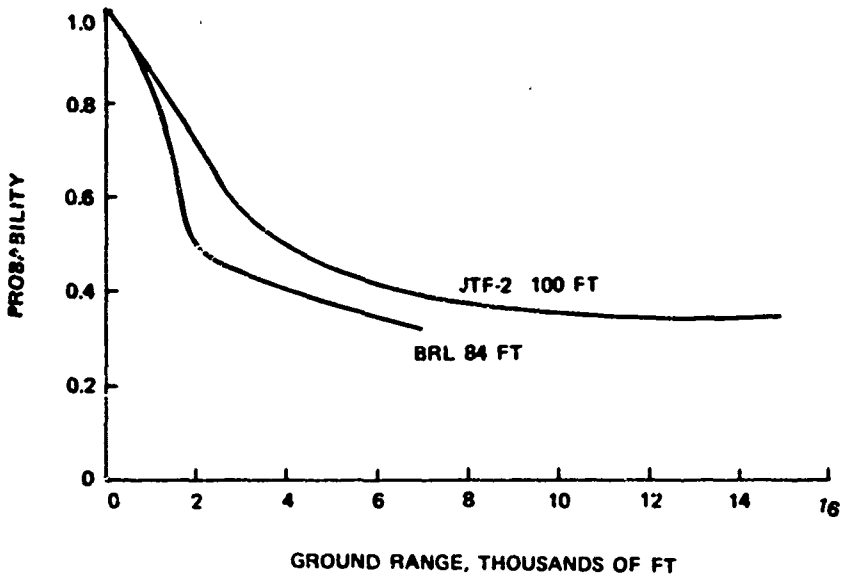
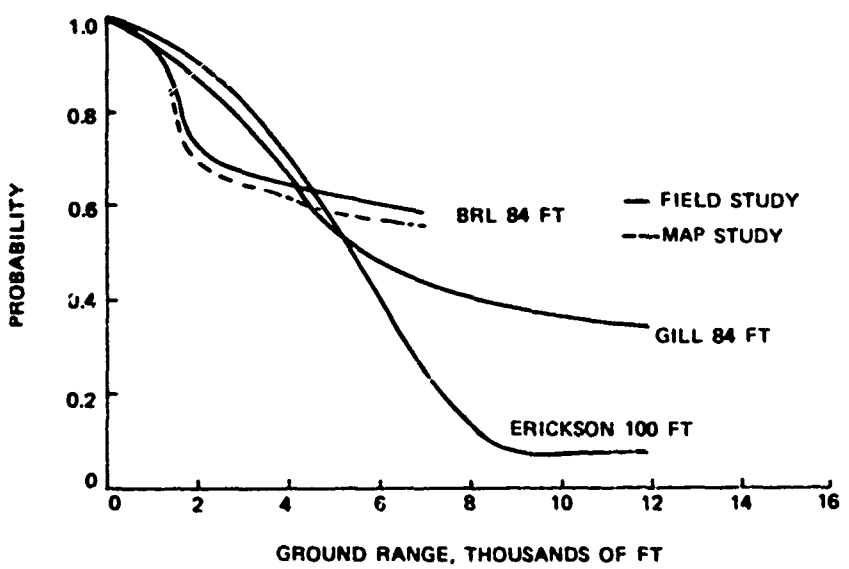


FIGURE 14. Combined Data for Six JTF-2 Targets.



(a) Field measurements with foliage.



(b) Map and field measurements; no foliage.

FIGURE 15. Probability of Target Exposure at Range r.

One of the problems with the masking data available is that it has not been validated. One expects field measurements to be better than map measurements, but no one has determined how many points must be measured to generate a valid probability curve for a given type of terrain. The closeness of the JTF-2 and BRL curves in Figure 15(a) are somewhat encouraging. They used very different techniques, in different, but similar, terrain to arrive at a quite similar result. This increases confidence in both sets of data.

In Figure 15(b) we see that the BRL map study closely agrees with the BRL field study, but Gill's attempt to reproduce the BRL results using Erickson's map technique was not successful. It is not surprising that the BRL map and field study results agree, since they measured exactly the same terrain profiles. The question raised by the discrepancy with Gill's work is whether the Gill-Erickson map technique is invalid or whether the two rays per section used by BRL fail to adequately represent the terrain type. The closeness of the BRL and JTF-2 data tend to favor BRL in this question.

Besides lack of validation, the main difficulty with map measurements has been how to include the effect of foliage. Slivinsky[7] (see reference 7, Table 1, p. 8) attempted to solve this problem by considering the green areas on contour maps to be covered with vegetation and by estimating tree heights from photographs. In Figure 16 the elevation angles to clear the highest masking feature, estimated by Slivinsky from maps and photos, are compared with the actual angles, as measured in the field, for the JTF-2 tests. The Slivinsky technique does not appear to be the ultimate solution. She felt that most of the discrepancies between the estimated and measured masking angles were due to isolated trees, which are not shown on maps, and to the fact that the most recent maps of the area were 20 years old.

The effect of target height should also be noted. The BRL study used rods 3.5 and 7 ft tall. The probability of the taller rod being unmasked was greater, even out to the maximum range of 7,000 ft, and for the maximum observation height of 324 ft. This was the only study specifically concerned with target height, but its results should be kept in mind when interpreting other data. Linge's target was a tank--height roughly equivalent to a 7-ft rod. Erickson and Gill presumed the target to be a point on the ground with no height. The JTF-2 lines of sight were measured from a surveyor's transit which is about 5 ft tall.

Presuming that one of the methods used does generate valid probability curves, not nearly enough work has been done to provide data for the variety of terrain types in which targets are likely to be found. Erickson is the only source that gives data for any terrain rougher than "gently rolling, mid-western type" terrain.

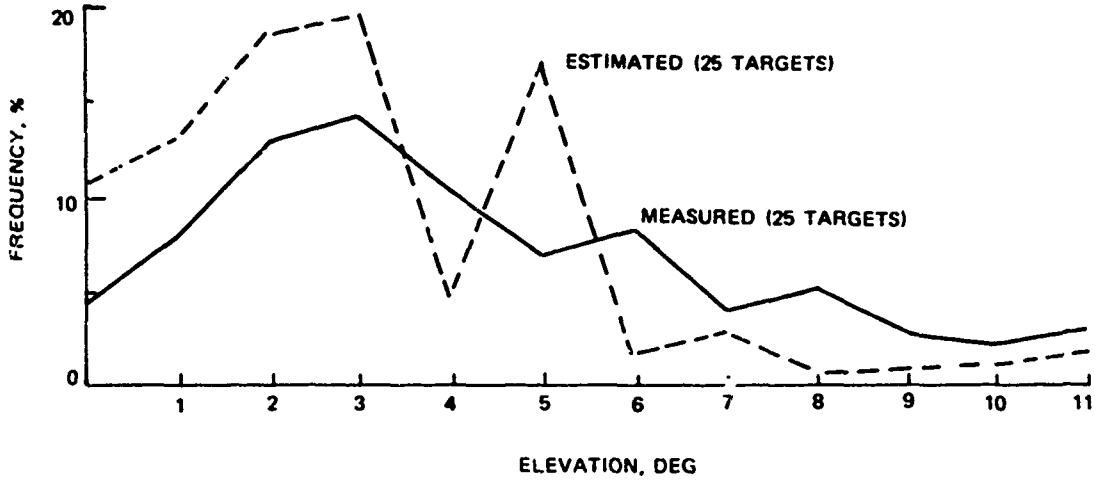


FIGURE 16. Histogram of the Frequency of Occurrence of Mask Angles as Estimated by Slivinsky and Measured by JTF-2.

APPLICATION OF DATA

Given that the data are rather sparse and unproven, they can still be useful. The combined JTF-2 data and the BRL data can be used with some confidence. Since these data are for fairly smooth terrain, they represent an upper bound on target exposure probability for rougher terrain. That is, if the JTF-2 curve shows that the probability of a target being exposed at a given altitude and range is 0.5, the probability of a target being exposed for those conditions is *less than* 0.5 for nearly all other terrain.

TERRAIN AND VEGETATION CLASSIFICATION

There have been several attempts to correlate terrain and vegetation characteristics with masking properties of the terrain. If such correlation could be made, probability of unmask could be predicted without actually measuring the line of sight. Some of the terrain characteristics are listed in order of expected usefulness.

AVERAGE SLOPE ANGLE

Average slope is the average of the absolute slope angle measured over some finite area in the vicinity of the target in question. Slope angle varies from 0 to 90 deg.

GRADIENT (AVERAGE SLOPE)

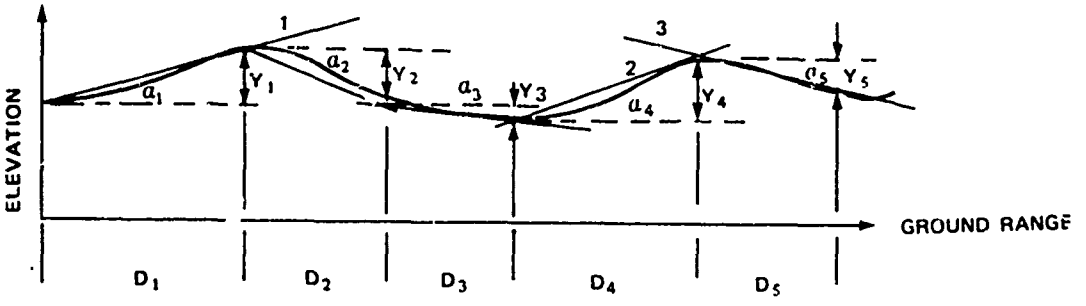
Gradient is the average of the absolute slope.

Slope = tangent (slope angle). In fairly flat terrain, slope and slope angle are nearly equal, since an angle and its tangent are equal for small angles. For more rugged terrain, slope increases faster than slope angle and varies from 0 to infinity.

NUMBER OF SLOPE DIRECTION CHANGES

The number of slope changes is the average number of times the slope changes direction in a given length. Figure 17 illustrates slope angle, gradient, and slope direction changes. When slope direction changes and slope are measured from topological maps, their values are quite dependent on the contour interval shown on the maps. Figure 18 shows the relationship between the values measured on 20-ft-interval maps and those measured on 40-ft-interval maps.

Erickson, Gill, and Stohler have attempted to relate probability of unmask to average slope or slope angle and number of slope direction changes. In Erickson's study, both slope angle and slope direction changes correlated with unmask probability up to the very rough terrain. For very rough terrain, slope direction change followed probability, where slope angle did not. Erickson made his slope measurements on 40-ft-interval maps. Gill used Erickson's technique on the BRL study areas near Baltimore. Her work did not confirm the slope direction change relationship to masking. Gill used 20-ft-interval maps. Slope angle and average number of slope direction changes are shown on the probability versus range curves plotted by Erickson and Gill in Figures 8 and 9, already cited.



$$\text{AVERAGE SLOPE ANGLE} = \frac{|a_1|\,D_1 + |a_2|\,D_2 + a_3\,|D_3| - a_4\,|D_4| + a_5\,|D_5|}{D_1 + D_2 + D_3 + D_4 + D_5}$$

$$\text{AVERAGE SLOPE} = \frac{|Y_1|/D_1 + |Y_2|/D_2 + |Y_3|/D_3 + |Y_4|/D_4 + |Y_5|/D_5}{D_1 + D_2 + D_3 + D_4 + D_5}$$

SLOPE DIRECTION CHANGES = 3

FIGURE 17. Illustration of Average Slope Angle, Average Slope, and Number of Slope Direction Changes.

In work leading to this report, author Stohler tried to relate slope angle and slope direction change to masking probabilities using the JTF-2 data. Average slope and average number of slope direction changes are noted on all the previously cited JTF-2 probability curves (Figures 10 and 11). Average slope and slope direction changes versus probability for the JTF-2 4.4 targets are shown in Figures 19 and 20. No relationship between them is obvious. Maps with 100-ft contour intervals were used for those measurements. Average slope versus probability for the JTF-2 4.1 targets is plotted in Figure 21 and again no obvious relationship exists. Forty-foot contours were used in the Figure 21 measurements.

RELIEF

Relief is the difference in elevation between the highest ground and the lowest ground in a representative area.

GRAIN

If relief is measured in a circular area whose radius is r, it is noted that when r is small relief increases rapidly as r increases up to a well-defined point, after which it increases very slowly. This point, described as a knick point, occurs at R' which is defined as the grain of the area. Grain describes the coarse texture of the surface and defines the minimum size of a sample area which represents the whole.

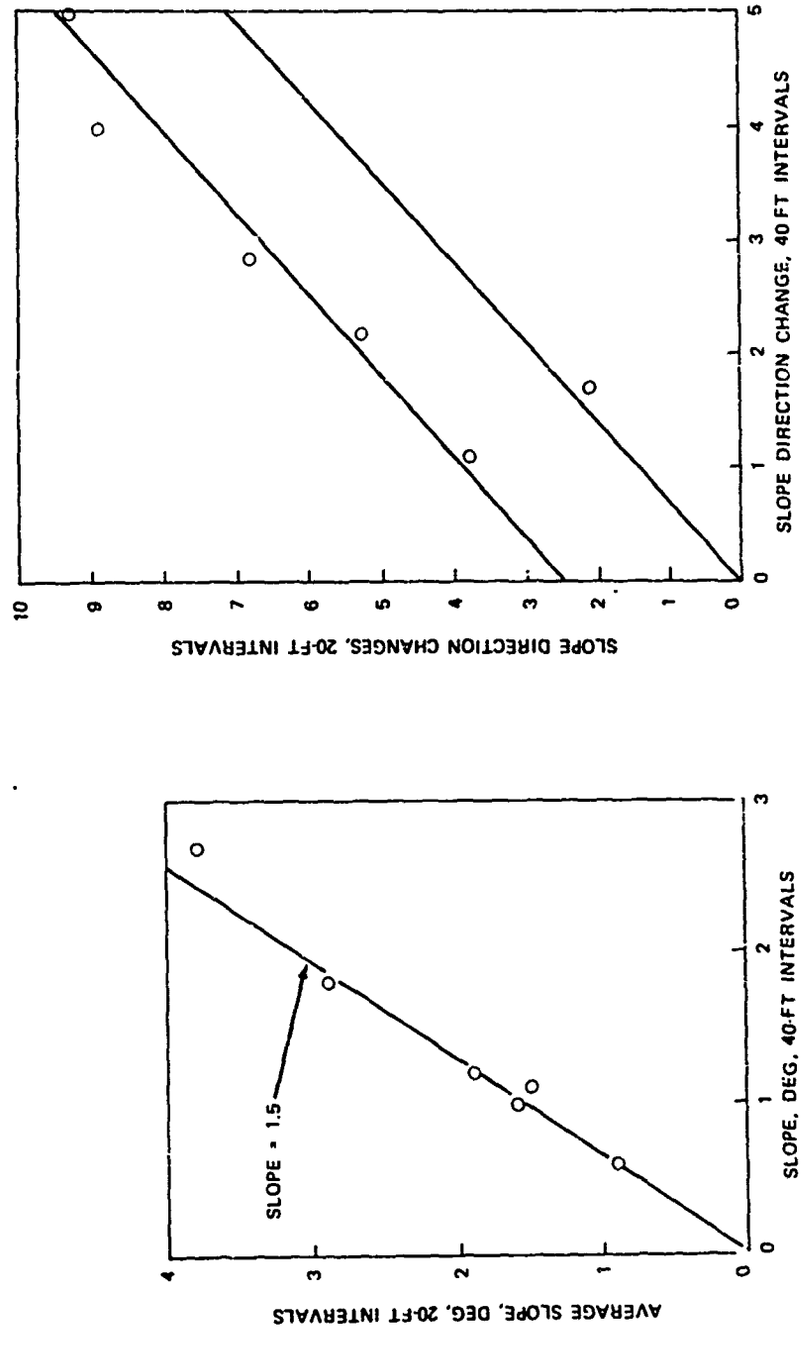


FIGURE 18. Effect of Map Contour Interval Size on Slope and Slope Direction Change Measurements.

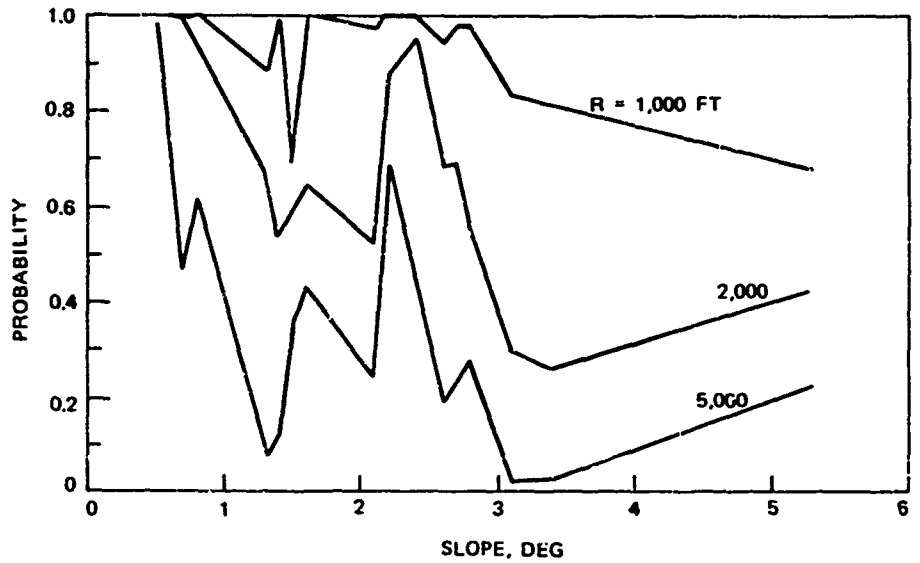


FIGURE 19. Probability Versus Average Slope Angle, JTF-2 Test 4.4 Targets.

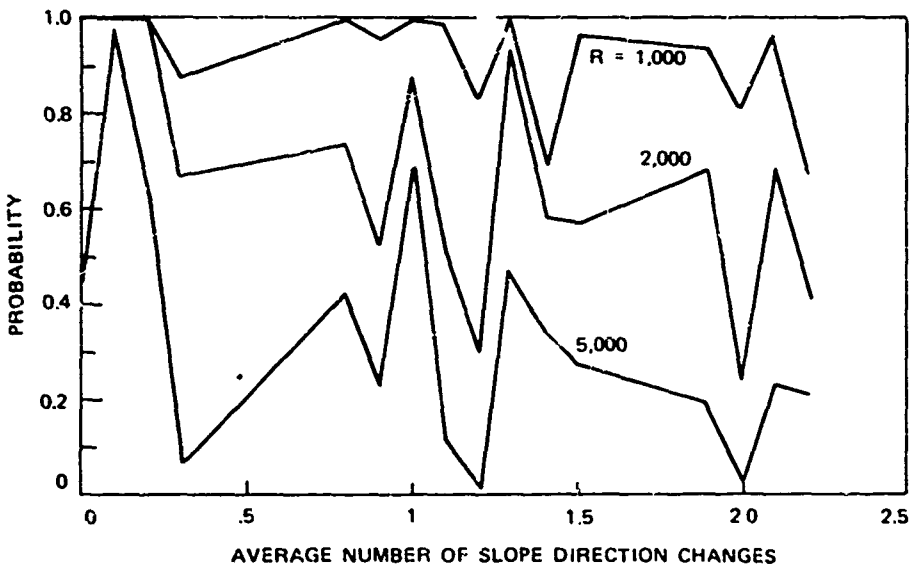


FIGURE 20. Probability Versus Slope Direction Changes, JTF-2 Test 4.4 Targets.

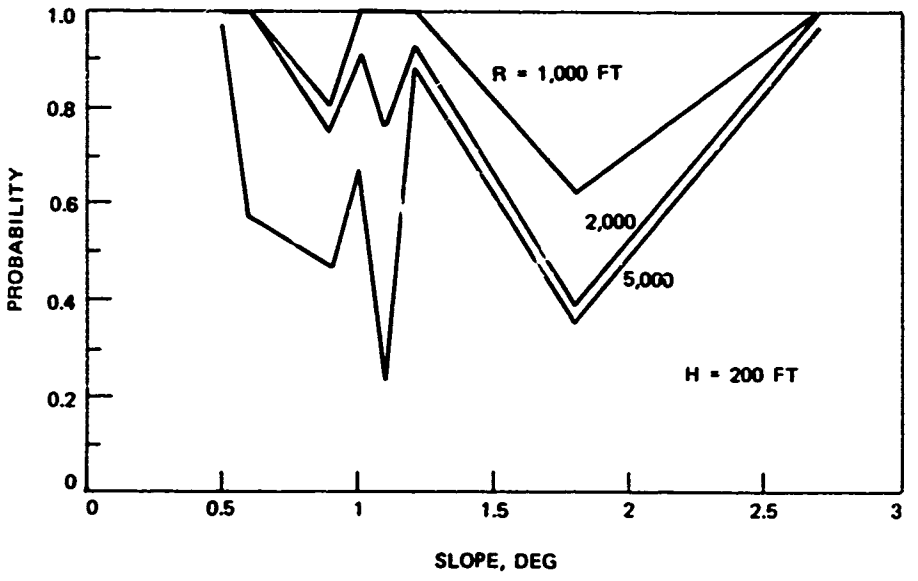


FIGURE 21. Probability Versus Average Slope Angle, JTF-2 Test 4.1 Targets.

ELEVATION RELIEF RATIO

The ratio is defined by the formula

$$ER = \frac{E' - L'}{R'}$$

where

ER = elevation relief ratio
E' = average elevation
R' = relief
L' = lowest elevation

This ratio, with a range from 0 to 1, indicates whether most of the terrain is predominantly below mean height with some high peaks (ER near 0), or above, with some ravines (ER near 1).

Other measures have been used to describe terrain such as the standard deviation of the altitudes and Poisson distributions. They do not offer much promise for making realistic predictions of unmask probability.

VEGETATION

Vegetation characteristics most likely to affect target masking are:

1. Foliage height
2. Foliage density
3. Cluster density (stands per unit area)
4. Height of lowest tree branches
5. Mean free path of open area
6. Direction of mean free path.

There has been very little work in the area of classifying vegetation by its target-masking characteristics. Vegetation effects cannot be separated from the target that is under consideration. If personnel are the object of the search, even grasses and bushes can provide a very high order of concealment. However, if a SAM site is considered, the vegetation concealment can never be very successful, since the operational requirements for the SAM site dictate an open area. Other military vehicles, such as a truck or tank, can successfully hide in the edge of a wooded area, and emerge when the aircraft has passed.

RECOMMENDATIONS FOR FUTURE WORK

To better define the role masking plays in air-to-ground visual detection, the following areas are suggested for additional study:

1. Examine the various types of air-to-ground missions that are conducted and define the appropriate probabilities that would apply.

2. Examine the requirements for cleared areas by ground target classification, such as light antiaircraft guns, SAM sites, and supply dumps. This examination should be able to define minimum masking probabilities likely for these types of targets.

3. Conduct an extensive search for any measured masking data that might exist. Because of the wide variation caused by local effects, very large sample sizes will be required before smooth curves can be verified. Determine the terrain types surrounding each JTF-2 target. Combine data for all the targets in each terrain type.

4. Map studies appear to offer promise in providing masking data for specific areas. Work should be conducted to confirm these data by conducting map studies in the JTF-2 target areas and any other regions where measured information is available.

5. Continue the work begun in relating terrain ruggedness measures to general masking probability. Examine the effects of map contour interval step size so that data from various maps can be compared.

6. Examine the classifications for vegetation and the possibility of applying them to the general terrain-masking results. One possible approach may be to consider that vegetation causes a change in masking angle, before the results are converted to probabilities.

7. Consider a program of measuring extensive varieties of terrain using the JTF-2 technique and generating probability curves for each kind of terrain. Combine these into a handbook together with photos, topographic maps, and descriptions of the areas measured, so users can find curves to match terrain they are interested in.

Appendix

JTF-2 TABULATED MASKING DATA

This appendix provides the JTF-2 masking data in tabular form, as read from angle plots provided to JTF-2 by the Corps of Engineers. Included are the data from 16 targets used in Test 4.4 (airborne reconnaissance). Elevation masking angles (in deg) are measured from target center over a full 360 deg in azimuth, and arranged so that linear interpolation may be used for intermediate azimuth values. The masking element is identified from the code, where 1 is terrain mask, 2 is tree line, and 3 is the mask angle caused by a single tree, usually at close range. Range is that distance (in ft) measured from target center to the highest masking feature, to the nearest 100 feet.

Masking angles for the eight JTF-2 Test 4.1 targets are also listed, using the same format as for the Test 4.4 targets. The angles are measured from -90 to +90 deg about the approach angle to the target; and are translated here to 0 to 180 deg in azimuth, to eliminate the negative angles.

Slope and slope change data were averaged over a map square 12,000 ft on a side, with the target at the center. The 4.4 data were averaged from a contour map drawn of the Mena, Ark. area for JTF-2 by the Corps of Engineers. Contour intervals of 100 ft were used.

Test 4.1 slope and slope change data were derived from topographic maps published by the U. S. Geological Survey. Contour intervals of 40 and 20 ft were provided. These maps provided the source that allowed comparison of slope and slope change data, discussed in the text.

The following tables show the results of the slope information derived for the JTF-2 targets in the Mena, Ark. area.

TABLE A-1. Selected Test 4.4 Targets.

Target	Average slope, deg, 100-ft contour	Average number of slope changes, 12,000-ft sq	Number of measured elevation masking angle points
1	0.7	0.0	156
2	3.1	1.2	138
4	1.6	0.8	148
5	2.4	1.3	206
6	2.6	1.9	121
7	3.8	2.0	83
8	5.3	2.2	197
10	2.2	1.0	193
11	2.1	0.9	194
12	0.8	0.2	193
15	0.5	0.1	203
16	2.7	2.1	199
18	1.4	1.1	201
19	2.8	1.5	136
20	1.3	0.3	133
23	1.5	1.4	194

TABLE A-2. Test 4.1 Targets.

Target	Average slope angle, deg		Average number of slope changes		Number of measured elevation masking points
	20-ft contour interval	40-ft contour interval	20-ft contour interval	40-ft contour interval	
E1	2.9	1.8	8.9	4.0	42
E2	---[a]	0.9	---[a]	1.6	50
E3	---[a]	0.5	---[a]	0.9	89
E4	3.8	2.7	9.3	4.9	66
W1	0.9	0.6	3.8	1.1	61
W2	1.6	1.0	5.3	2.2	52
W3	1.5	1.1	2.1	1.7	40
W4	1.8	1.2	6.8	2.6	36

[a] 20-ft interval maps not available for Targets E2 and E3.

JTF-2 TEST 4.1 TARGET E1 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	100	13.3	2	7.0	200	8.9	2
34.0	200	14.3	2	36.0	400	6.3	2
45.7	200	12.5	2	54.0	200	11.4	2
59.2	300	6.0	2	61.0	400	5.2	2
64.8	8000	1.4	1	65.2	1400	1.0	2
66.2	1400	1.4	2	67.5	400	2.6	2
69.1	6000	1.6	1	83.0	600	1.2	2
83.5	900	1.0	2	84.3	400	1.4	2
92.1	1000	2.0	2	102.2	300	1.9	2
102.6	900	1.4	3	102.9	23700	1.2	1
103.8	900	1.2	3	105.0	19900	1.4	1
105.8	300	2.7	3	106.7	22600	1.2	1
109.8	300	1.9	3	109.8	22100	1.4	1
110.4	800	.8	3	111.8	21800	1.3	1
111.8	2500	1.0	2	113.6	21900	1.2	1
115.9	22500	1.5	1	116.3	2500	1.2	2
120.5	4100	1.8	2	127.9	2500	1.5	2
131.4	2300	1.7	2	134.5	200	3.0	2
137.2	21000	1.5	1	138.4	21000	1.5	1
139.1	200	7.5	2	154.0	200	13.5	2
171.5	100	32.2	2	180.0	100	18.0	2

JTF-2 TEST 4.1				TARGET E2	MASK DATA		
AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	15000	1.8	1	.8	900	1.6	2
2.2	7800	1.3	1	2.5	11700	1.4	1
5.4	900	1.7	2	7.8	300	2.3	2
8.6	1300	2.0	2	10.9	900	1.3	2
13.0	7900	1.0	1	28.8	2400	3.9	2
37.2	2200	4.1	2	45.8	400	4.4	2
57.5	600	3.0	2	60.6	600	3.1	2
66.9	29700	1.4	1	67.0	2100	1.2	1
67.4	300	1.4	2	69.0	44200	1.5	1
69.6	29700	1.6	1	70.9	35100	1.4	1
74.0	34000	1.8	1	78.4	300	1.6	2
78.5	28800	1.6	1	78.6	11800	.6	1
82.5	28800	1.7	1	82.7	11800	.6	1
85.2	13100	.6	1	86.4	26700	2.0	1
91.7	1200	1.0	2	90.0	1200	.6	2
91.3	19500	.8	1	92.0	25200	2.2	1
92.9	19500	.9	1	94.4	25200	1.9	1
97.0	24900	2.1	1	99.8	12100	.8	1
101.9	300	1.3	3	102.1	24600	2.1	1
103.0	12100	.8	1	104.7	100	1.6	2
105.9	1400	1.0	2	106.5	47700	1.6	1
109.7	1400	2.0	2	112.6	24400	2.4	1
119.9	38400	4.7	1	129.2	18300	7.0	1
139.2	16100	3.1	1	142.2	11400	8.4	1
153.9	200	10.9	2	180.0	100	15.0	2

JTF-2 TEST 4.1				TARGET E3 MASK DATA			
AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	600	3.4	2	3.7	600	4.4	2
6.3	600	4.4	2	8.2	2500	1.5	2
11.5	5600	.8	2	12.3	2700	1.2	2
15.5	2800	1.4	2	16.0	3500	1.1	2
29.0	3500	1.3	2	31.5	2900	1.4	2
36.3	2100	1.5	2	38.8	400	6.9	3
46.0	600	3.5	3	48.0	36000	1.6	1
48.0	2600	1.3	2	49.7	600	4.2	3
50.8	26200	1.2	1	50.8	2600	1.1	2
51.6	32000	1.7	1	52.7	26200	1.2	1
52.8	2600	1.3	2	53.1	30900	1.5	1
56.2	600	4.3	3	59.2	600	4.3	3
62.3	30300	1.8	1	62.7	4600	.9	2
65.1	28900	1.1	1	65.7	28800	1.1	1
66.3	500	.9	2	67.6	1000	1.6	2
68.4	4900	1.0	2	68.7	24000	2.5	1
70.3	5200	1.0	2	71.5	700	2.3	2
73.4	22400	2.6	1	73.6	1100	1.8	3
74.7	2000	1.3	3	75.9	7200	.9	2
76.9	700	3.2	3	78.1	1800	1.4	2
80.3	24600	2.4	1	80.3	1800	.8	2
82.0	6600	.9	2	82.5	24400	2.3	1
85.6	6600	1.0	2	87.2	2000	1.6	2
88.2	20200	2.6	1	89.3	6300	.9	2
91.0	2000	1.5	2	91.1	21000	3.1	1
92.4	5900	.9	2	96.0	4300	.8	2
96.5	21300	2.8	1	97.5	1100	2.5	3
99.0	6300	.8	2	99.5	2800	1.0	2
101.7	23000	2.1	1	101.7	45200	2.1	1
103.7	23100	2.2	1	107.7	22500	2.8	1
107.7	2700	1.2	2	114.2	23000	2.9	1
121.4	24300	2.7	1	122.6	24600	2.8	1
128.0	25400	2.5	1	128.0	3200	1.0	2
139.0	1800	1.5	2	129.9	26200	2.2	1
130.3	2700	1.1	2	131.9	27800	2.2	1
134.5	29100	2.4	1	138.6	30100	2.4	1
139.5	2100	1.6	2	144.8	32100	2.1	1
148.7	34500	1.6	1	148.7	2000	1.6	2
152.5	600	4.3	3	154.7	37500	1.8	1
155.0	1500	1.7	2	157.3	38700	1.6	1
160.6	1800	2.2	2	163.0	41800	1.7	1
163.0	1700	1.2	2	164.7	2200	1.7	2
164.7	100	1.2	2	169.9	46600	1.4	1
173.5	1800	2.5	3	176.0	100	1.4	2
180.0	1500	1.8	2				

JTF-2 TEST 4.1 TARGET E4 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	3900	3.2	2	9.6	8800	1.9	1
10.1	9800	1.4	1	13.6	11800	2.5	1
15.3	13200	2.5	1	18.3	14400	1.5	1
20.8	2600	2.2	2	27.9	2900	3.0	2
28.3	600	3.1	2	30.8	3100	2.9	2
46.2	200	6.8	3	59.6	4500	2.0	2
64.2	4600	1.8	2	66.0	4800	1.4	2
73.7	5700	1.0	2	75.1	13200	1.0	1
75.2	5700	.7	2	77.8	6600	1.2	2
78.8	36500	1.0	1	78.8	6900	1.1	2
79.5	31800	.9	1	79.5	6900	1.0	2
81.5	26100	1.2	1	81.5	6900	1.0	2
83.1	25200	1.3	1	83.2	7200	.9	2
84.5	27000	1.5	1	85.8	27000	1.4	1
86.8	27000	1.4	1	88.2	27000	1.3	1
88.7	27200	1.2	1	90.0	6600	1.0	1
90.2	27800	1.4	1	90.7	27900	1.3	1
91.3	27100	1.2	1	91.9	27100	1.3	1
95.8	31800	1.6	1	96.5	28200	1.5	1
97.7	28400	1.6	1	102.3	9800	1.0	1
103.1	8500	1.5	1	103.2	28700	1.6	1
106.8	27100	2.1	1	108.0	27900	1.8	1
108.0	8100	1.8	2	109.3	8100	2.0	1
112.1	2800	2.3	1	115.5	7500	1.9	1
121.4	4400	1.9	1	130.5	5200	1.2	1
139.1	9800	1.6	1	142.5	7300	1.3	1
144.1	7300	.9	1	145.5	7900	.8	1
149.6	10600	.4	1	151.3	13200	.6	1
152.7	13100	.7	1	153.8	14100	.4	1
155.5	14100	.6	1	158.7	10200	.6	1
159.0	9800	1.0	1	164.4	11500	1.7	1
171.4	12000	1.7	1	173.8	11800	.9	1
176.2	11800	.8	1	180.0	10300	2.7	1

JTF-2 TEST 4.1				TARGET W1 MASK DATA			
AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
1.0	1000	3.0	2	2.2	1100	1.6	2
4.2	1000	3.2	2	28.5	1300	3.3	2
37.8	1300	1.6	2	48.1	2400	1.2	2
49.2	600	2.2	2	54.5	600	2.2	2
55.2	8300	.3	1	58.0	7900	.4	1
59.0	1100	1.3	2	62.0	700	2.0	2
63.5	30900	.8	1	63.5	700	.6	2
64.2	30900	.6	1	65.5	30700	.8	1
65.5	1500	.7	2	66.2	400	1.3	2
69.7	1800	1.1	2	72.0	26200	.6	1
72.0	5200	.6	2	74.2	2000	8.0	2
77.0	4500	.8	2	80.6	1000	1.0	2
81.7	0	0.0	2	84.2	1100	1.7	2
87.8	1300	1.6	2	89.0	42500	.6	1
89.0	8300	.5	2	90.0	2400	.8	2
91.8	41400	.4	1	93.5	27300	.8	1
93.8	2700	.6	2	95.0	21300	.6	1
95.4	38300	.6	1	96.0	38800	.7	1
96.8	40700	.6	1	99.0	31200	.9	1
101.7	30400	.8	1	102.2	30400	.7	1
104.1	30400	.9	1	105.2	0	0.0	1
105.2	0	0.0	2	107.7	700	2.6	2
110.1	700	2.2	2	112.3	39900	2.4	1
140.3	500	2.5	2	141.7	44400	1.1	1
143.8	44100	1.2	1	145.4	700	1.7	2
148.0	700	2.1	2	148.8	46200	.9	1
150.5	45500	.9	1	150.8	2100	1.2	2
152.0	46500	1.0	1	152.3	2200	.7	2
153.2	46500	.8	1	154.6	46500	.8	1
175.7	45900	1.2	1	176.3	1300	2.7	2
180.0	1300	3.2	2				

JTF-2 TEST 4.1				TARGET W2 MASK DATA			
AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	200	20.7	3	23.3	100	46.5	3
31.5	40000	.8	1	31.8	26300	.3	1
34.6	38700	.7	1	35.1	24900	.3	1
47.5	34500	.6	1	50.3	3300	.9	2
51.0	2900	.3	2	51.5	400	4.3	2
52.8	9500	.4	2	59.2	32700	.6	1
59.6	45100	.8	1	61.5	43300	.6	1
64.0	2500	.1	2	64.5	41000	.5	1
68.5	8900	0.0	1	68.6	43300	.6	1
71.2	42500	.6	1	74.0	400	4.4	2
75.8	43500	.5	1	80.5	21900	.4	1
80.7	100	27.1	3	82.2	12200	.7	1
85.0	400	4.8	2	96.5	300	6.0	2
98.6	3000	.8	2	100.2	19800	.3	1
104.7	100	22.1	3	105.7	19200	.2	1
106.0	3000	.8	2	106.3	47400	.6	1
108.6	500	2.8	2	117.3	700	1.7	2
117.5	3100	.3	2	118.3	24900	.2	1
124.0	200	20.8	3	128.1	48600	.4	1
129.5	500	5.1	2	129.8	30000	.6	1
131.0	3600	.6	2	134.5	300	13.4	3
137.8	4300	.5	2	138.4	38200	.2	1
141.0	300	9.0	3	146.5	100	44.7	3
155.2	200	21.3	3	155.5	400	11.4	3
158.3	29400	1.2	1	163.5	100	44.4	3
169.7	200	25.9	3	180.0	100	14.4	3

JTF-2 TEST 4.1 TARGET W3 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	1300	2.5	2	17.7	1200	2.0	2
18.0	35800	1.2	1	18.8	5900	.8	2
19.6	37200	1.4	1	21.2	37800	1.3	1
22.5	38500	1.5	1	22.0	2800	.8	2
22.8	1400	1.3	2	24.5	39600	1.5	1
24.7	2900	1.0	2	26.0	44400	1.8	1
26.3	2800	1.0	2	27.3	1200	1.7	2
28.8	3300	1.1	2	30.5	47400	1.4	1
35.4	3800	2.0	2	39.0	3100	1.2	2
40.6	1600	1.3	2	42.8	600	2.4	2
68.3	600	4.7	2	84.5	300	8.2	2
84.6	100	19.6	3	98.4	100	22.2	3
106.8	3600	3.2	1	109.8	3500	3.4	1
112.2	400	5.0	2	119.5	3000	3.7	1
121.5	600	3.3	2	122.9	400	4.0	2
123.5	3000	4.1	1	125.7	400	5.6	2
134.2	300	5.6	2	136.5	400	4.2	2
136.5	2800	4.5	1	139.6	400	6.9	2
146.7	2700	4.3	1	156.5	2800	4.4	2
161.2	400	8.6	2	180.0	300	6.2	2

JTF-2 TEST 4.1				TARGET W4	MASK DATA		
AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	1100	1.2	2	.5	300	5.9	3
22.6	900	2.2	2	24.8	600	3.9	3
26.0	2500	.5	2	33.5	25500	.1	1
38.2	2000	.5	2	40.0	2000	.2	2
40.5	8200	.4	1	44.6	7900	.3	1
44.8	15400	.3	1	49.0	13800	.5	1
49.5	3400	.1	1	56.6	10900	.4	1
58.9	4800	.6	1	66.6	3000	.4	1
71.7	8200	.7	1	84.5	6600	.8	2
103.5	5900	1.2	2	127.8	3700	1.0	2
136.3	3900	.9	2	147.0	4300	.6	2
149.0	4800	.6	2	151.5	4800	.5	2
152.5	800	2.2	3	153.5	16400	.4	1
153.5	4900	.5	2	160.8	13800	.3	1
163.0	4800	.2	2	164.0	1500	.8	2
164.3	1500	.5	2	166.5	20700	.4	1
168.7	1200	1.7	2	169.8	400	2.6	2
173.9	500	5.8	2	180.0	400	5.8	2

JTF-2 TEST 4.4 TARGET 1 MASK DATA							
AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	32800	1.0	1	0.0	16400	.6	1
0.0	3400	.3	2	1.7	200	4.9	2
11.9	200	9.5	2	16.1	200	7.3	2
18.9	200	5.1	2	21.0	1500	.4	2
22.1	1500	.8	2	23.9	200	1.2	2
25.6	200	8.3	2	32.1	200	9.3	2
37.6	200	8.9	2	40.1	1000	2.0	2
41.1	900	2.1	2	45.9	200	7.4	2
52.0	300	8.2	2	54.7	300	7.5	2
59.3	300	7.5	2	61.6	200	8.5	2
64.1	700	3.5	2	65.9	400	5.1	2
67.0	200	9.1	2	71.8	200	9.1	2
72.8	400	6.6	2	75.1	400	6.6	2
77.3	200	6.1	2	79.3	300	7.2	2
80.9	300	7.2	2	86.0	400	8.1	2
88.1	200	9.9	2	96.7	200	10.3	2
100.3	300	8.4	2	103.9	300	9.3	2
109.1	300	7.6	2	111.5	300	8.3	2
114.2	300	7.4	2	119.2	200	11.7	2
121.3	300	7.9	2	124.2	300	9.5	2
128.3	300	8.5	2	133.7	300	9.8	2
137.1	200	12.4	2	140.1	500	6.3	2
145.7	200	10.2	2	149.9	200	9.9	2
150.8	4700	5.3	2	154.1	4900	5.6	2
156.1	300	7.6	3	156.1	500	6.2	2
159.5	500	6.3	2	161.5	5500	6.0	2
166.2	5200	6.0	2	169.7	5400	5.2	2
173.3	4900	4.3	2	176.7	5100	4.3	2
186.9	5200	3.9	2	189.9	5900	3.7	2
190.4	5900	3.6	2	191.0	6400	3.6	2
194.1	5900	3.2	2	196.1	6100	2.9	2
196.5	2500	2.9	2	199.6	2600	2.8	2
200.3	2600	2.8	2	200.8	2600	2.6	2
201.8	2500	2.6	2	202.5	3800	2.5	2
203.2	3600	2.5	2	203.8	11800	2.5	2
204.2	13100	2.4	2	204.3	13100	2.5	2
206.9	11800	2.5	2	207.0	400	2.4	2
207.9	11300	2.5	2	209.2	3100	2.7	2
211.5	400	5.0	3	213.3	3200	2.7	2
215.3	3100	2.7	2	228.1	100	19.0	3
234.0	100	19.1	3	234.1	3000	2.7	2
237.7	3000	2.7	2	239.6	3700	2.6	2
241.2	3500	2.5	2	241.9	8200	2.4	2
244.5	7200	2.6	2	247.1	7500	2.5	2
249.3	7200	2.2	2	251.1	7200	2.4	2

JTF-2 TEST 4.4				TARGET 1 MASK DATA			
AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
253.9	6900	1.8	2	254.1	3700	2.1	2
256.9	3500	1.9	2	257.1	3500	1.6	2
258.1	3700	1.4	2	258.6	3500	1.4	2
259.1	3500	1.2	2	260.1	2400	1.1	2
261.4	2500	1.4	2	262.2	2600	1.4	2
262.6	2800	1.2	2	263.1	2500	1.5	2
264.7	2600	1.6	2	265.1	2800	1.3	2
265.9	700	1.7	3	267.1	700	1.7	3
267.7	2700	1.4	2	270.7	2700	1.1	2
272.6	2900	1.4	2	273.6	200	6.0	3
277.9	200	6.0	3	283.3	3000	1.2	2
285.1	700	1.8	2	286.5	1000	.9	2
288.9	800	1.6	2	292.1	1200	1.0	2
296.1	1200	1.5	2	300.3	1100	2.0	2
306.4	1000	1.4	2	308.3	1000	1.6	2
309.9	500	2.5	2	311.1	900	2.0	2
313.4	600	3.0	2	315.9	1200	1.4	2
319.3	1200	1.2	2	323.9	1100	1.2	2
326.6	1500	1.3	2	329.5	1500	1.1	2
330.2	500	3.6	3	332.8	500	3.7	3
333.0	500	2.7	3	335.6	500	2.7	3
338.0	800	2.5	3	340.7	500	3.1	3
342.7	19700	.9	1	342.8	13100	.8	1
342.9	1500	.6	2	347.5	19700	.5	1
347.6	16400	.8	1	347.7	3300	1.0	2
349.1	200	5.5	3	353.2	200	5.5	3
354.7	23000	.7	1	354.8	18000	.7	1
354.9	3300	.5	2	355.0	23000	.5	1
355.1	18000	.7	1	355.2	3300	.7	2
356.0	800	1.2	2	356.9	900	1.8	2
357.4	500	2.6	2	358.6	600	2.6	2
360.0	32800	1.0	1	360.0	16400	.6	1
360.0	3400	.3	2	361.7	200	4.9	2

JTF-2 TEST 4.4 TARGET 2 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	200	8.2	2	3.0	300	8.6	2
10.0	200	16.0	2	13.0	300	15.6	2
17.0	400	9.4	2	20.0	400	7.8	2
22.5	200	9.0	2	24.5	400	6.5	2
27.7	400	6.6	2	29.7	300	12.8	2
33.6	300	10.5	2	35.3	400	8.0	2
37.7	400	8.4	2	40.2	600	8.0	2
43.4	400	10.2	2	46.6	400	10.7	2
49.2	500	7.2	2	51.0	400	8.8	2
54.2	500	9.4	2	56.6	400	8.4	2
58.3	600	7.0	2	60.2	500	7.8	2
63.2	500	9.0	2	66.4	500	8.0	2
67.5	900	5.1	2	69.7	600	6.1	2
70.4	600	5.0	2	72.5	600	5.2	2
74.5	500	6.2	2	77.2	500	7.8	2
79.7	600	7.4	2	82.2	500	8.0	2
85.2	500	7.9	2	86.9	500	8.2	2
88.9	500	7.1	2	91.0	500	8.0	2
92.0	600	6.8	2	93.5	600	7.6	2
96.5	500	7.6	2	98.8	600	5.8	2
100.8	500	8.3	2	102.5	500	7.5	2
104.5	500	7.6	2	106.4	500	6.8	2
108.5	500	7.4	2	109.4	100	15.0	3
123.8	100	15.0	3	124.2	2300	6.8	2
128.8	2400	7.6	2	132.2	2500	8.0	2
136.0	2200	8.2	2	139.5	2200	8.8	2
142.6	1800	9.2	2	146.5	2000	9.8	2
150.3	1900	10.3	2	154.0	1600	10.8	2
158.2	1800	11.1	2	161.2	1700	10.7	2
165.2	1800	10.6	2	168.6	1800	10.4	2
172.2	1800	10.0	2	177.2	1900	9.5	2
180.3	1900	9.1	2	184.2	1900	8.3	2
187.7	1900	7.5	2	191.2	2000	6.6	2
195.3	2600	5.4	2	200.2	2500	6.0	2
201.5	2600	6.0	2	202.0	200	11.4	2
208.8	200	11.4	2	208.9	2600	6.6	2
212.2	3100	6.6	2	216.0	3100	6.0	2
220.2	3700	5.0	2	223.6	3600	4.6	2
227.5	3900	4.7	2	231.3	4300	4.7	2
231.6	500	6.1	2	235.5	500	6.1	2
235.9	1300	3.2	2	235.9	4900	4.1	1
237.5	1300	3.2	2	237.5	4900	3.6	1
239.4	1200	2.8	2	239.4	5700	3.0	1
241.5	1600	2.4	2	241.5	5900	2.8	1
245.2	1500	2.2	2	245.2	11200	2.6	1

JTF-2 TEST 4.4 TARGET 2 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
245.9	1400	3.0	2	248.2	1300	3.6	2
250.0	1300	3.0	2	251.8	1200	3.6	2
254.8	1200	3.1	2	256.5	1600	2.2	2
258.4	100	24.6	2	269.4	100	24.7	2
270.5	1100	2.8	2	273.6	1200	2.8	2
274.4	500	6.6	2	280.0	500	6.6	2
280.5	2600	3.1	2	280.5	9800	3.4	1
281.5	2500	2.9	2	281.5	9800	3.4	1
282.5	4600	2.9	2	282.9	9800	3.6	1
283.3	1000	4.2	2	285.9	600	6.3	2
288.0	900	3.0	2	288.0	6600	4.8	1
290.1	900	3.8	2	290.1	7500	4.2	1
291.9	900	4.2	2	291.9	7500	4.2	1
293.6	600	4.8	2	295.7	600	6.8	2
301.8	500	7.8	2	302.1	500	4.4	2
302.1	7200	4.9	1	304.2	900	4.2	2
304.2	6600	5.2	1	305.5	800	4.8	2
305.5	6900	5.1	1	309.4	200	9.7	2
311.6	300	11.8	2	318.9	400	6.7	2
322.3	400	7.8	2	326.6	500	7.6	2
330.5	300	10.8	2	335.5	300	12.1	2
340.7	300	15.0	2	348.9	300	13.2	2
354.0	300	10.5	2	357.4	300	10.4	2
360.0	200	8.2	2	363.0	300	8.6	2

JTF-2 TEST 4.4 TARGET 4 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	7900	4.0	1	9.0	8200	4.0	1
12.1	8200	3.9	1	15.0	7900	3.8	1
18.1	8200	3.7	1	21.0	8200	3.6	1
24.1	8900	3.5	1	25.2	8900	3.5	1
25.2	400	3.5	2	27.0	400	5.2	2
31.5	400	3.7	2	34.5	400	3.5	2
37.7	300	5.0	2	44.5	300	6.5	2
47.2	300	6.2	2	52.1	200	6.1	2
57.2	300	5.8	2	61.0	300	5.6	2
63.9	200	8.4	2	68.6	300	5.3	2
70.6	300	4.9	2	73.1	300	6.8	2
75.2	300	6.8	2	76.8	500	4.4	2
86.9	200	6.6	2	90.0	300	7.0	2
93.5	300	7.4	2	99.1	200	7.8	2
102.0	200	6.4	2	106.0	200	7.6	2
108.0	200	6.7	2	111.5	200	7.2	2
116.5	200	7.0	2	119.6	700	5.0	2
122.1	300	7.4	2	125.8	300	7.4	2
128.0	400	4.9	2	130.3	400	5.7	2
132.3	400	4.9	2	135.0	300	6.7	2
138.3	300	8.2	2	141.0	1100	5.4	2
143.1	8200	3.9	2	143.9	500	5.4	2
147.9	500	5.4	2	149.3	6600	3.9	1
151.0	600	4.5	2	153.9	700	4.4	2
154.6	6600	3.9	1	157.5	6600	3.7	1
159.2	5200	3.6	1	161.1	5900	3.4	1
163.2	5900	3.3	1	165.1	5600	3.0	1
166.8	6300	2.8	1	166.8	1100	2.8	2
167.2	3700	3.0	1	167.2	1100	3.0	2
167.7	1100	2.9	2	169.1	4300	3.0	1
171.5	3400	3.2	1	173.9	3700	3.3	1
176.1	3800	3.4	1	178.2	4100	3.4	1
180.2	4400	3.3	1	182.2	4400	3.3	1
183.0	4300	3.2	1	183.0	600	3.2	2
184.6	600	4.8	2	186.8	600	4.7	2
189.8	500	4.6	2	194.1	500	6.4	2
199.1	600	5.0	2	202.2	500	6.4	2
206.9	500	7.0	2	212.2	500	6.6	2
214.5	500	3.6	2	217.5	800	3.3	2
220.1	500	5.9	2	224.6	400	6.0	2
229.3	500	4.2	2	232.0	500	3.4	2
233.1	500	1.8	2	234.7	500	4.0	2
239.5	500	4.9	2	242.3	500	3.8	2
244.8	500	3.4	2	246.8	500	1.9	2
246.8	2600	1.9	2	249.0	2500	1.9	2

JTF-2 TEST 4.4 TARGET 4 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
250.9	2400	1.9	2	253.1	2400	1.9	2
255.3	2300	2.0	2	257.1	2300	2.1	2
258.9	2300	2.0	2	261.0	2200	2.0	2
264.0	1800	1.9	2	265.9	1900	1.5	2
266.1	1900	1.7	2	268.4	2100	1.2	2
268.9	1800	1.5	2	270.5	1900	1.5	2
271.9	1700	1.8	2	274.5	1900	1.3	2
276.1	1700	1.5	2	278.0	1600	1.6	2
280.2	1500	1.8	2	282.1	1600	1.7	2
284.2	1600	1.5	2	285.7	1600	1.2	2
286.6	1700	1.2	2	288.9	1600	1.2	2
289.6	1600	1.1	2	291.8	1600	1.4	2
292.8	800	2.3	3	293.6	900	1.9	3
294.7	2100	1.2	2	295.1	1900	1.3	2
295.1	13100	1.3	1	297.1	16100	1.7	1
298.2	13100	2.0	1	302.2	11200	2.2	1
304.2	13100	2.4	1	306.2	11200	2.6	1
308.2	9800	2.6	1	310.1	9800	2.9	1
312.1	9800	3.0	1	314.9	10100	3.1	1
316.9	9800	3.2	1	318.9	9200	3.2	1
320.9	9800	3.3	1	324.0	8900	3.4	1
326.1	7900	3.5	1	328.2	9500	3.5	1
330.1	8900	3.5	1	332.1	10100	3.4	1
334.1	8900	3.4	1	336.0	8500	3.3	1
338.1	8200	3.3	1	340.2	9800	3.4	1
342.2	8900	3.6	1	344.2	9200	3.8	1
346.2	9500	3.9	1	348.2	8900	4.0	1
350.2	8500	4.1	1	352.2	8200	4.0	1
358.0	8200	4.0	1	360.0	7900	4.0	1

JTF-2 TEST 4.4 TARGET 5 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	200	3.8	3	.2	6600	3.2	1
3.0	6100	3.4	1	5.2	5700	3.5	1
7.2	6100	3.6	1	9.0	5100	3.7	1
11.1	5100	3.8	1	13.0	2900	3.9	1
13.7	5200	3.9	1	13.9	300	7.8	3
19.2	300	7.8	3	19.3	5100	4.2	1
21.4	5100	4.4	1	23.0	5200	4.4	1
25.0	5100	4.4	1	27.0	5100	4.4	1
29.0	5100	4.3	1	31.2	4600	4.2	1
33.0	5200	4.2	1	35.1	5900	3.8	1
37.0	6400	3.7	1	39.1	6600	3.4	1
41.0	7200	3.2	1	43.0	7200	3.0	1
44.0	6900	2.8	1	44.0	300	2.8	2
44.6	300	7.1	3	47.9	300	7.1	3
48.9	300	7.3	3	52.4	300	7.3	3
52.4	3100	1.2	1	52.4	300	1.2	2
54.5	3300	1.0	2	56.2	3300	.8	1
56.2	400	3.7	2	58.6	400	3.7	2
59.9	500	2.0	2	62.2	500	3.1	2
64.3	500	3.9	2	65.9	500	2.9	2
67.4	500	3.8	2	69.3	500	2.6	2
70.9	500	3.3	2	73.8	500	2.9	2
76.7	400	3.1	2	80.4	500	3.3	2
87.3	500	4.6	2	89.6	500	4.1	2
92.2	500	3.7	2	93.5	500	1.9	2
93.5	7500	1.9	1	96.7	6600	2.1	1
97.7	5700	2.3	1	99.5	5400	2.6	1
101.9	5500	2.8	1	103.6	5900	2.9	1
105.3	5200	3.1	1	107.3	6400	3.2	1
109.4	5500	3.3	1	112.4	5700	3.5	1
114.8	5700	3.5	1	116.7	5200	3.6	1
118.5	5700	3.6	1	120.3	5700	3.6	1
122.3	5400	3.7	1	124.6	5700	3.6	1
127.0	5900	3.6	1	129.0	6400	3.5	1
130.3	6900	3.4	1	130.3	500	3.4	2
130.9	500	4.5	2	133.3	500	4.5	2
133.6	500	3.5	2	133.6	6900	3.5	1
136.3	7500	3.6	1	138.4	7900	3.4	1
138.4	500	3.4	2	139.3	500	4.1	2
140.3	500	3.4	2	140.3	7900	3.4	1
141.0	7900	3.3	1	141.0	3300	3.3	2
143.3	3300	3.4	1	143.3	500	3.4	2
143.5	500	5.1	2	146.1	500	5.1	2
146.4	500	3.8	2	146.4	3500	3.8	1
149.5	3200	4.1	1	149.5	500	4.1	2

JTF-2 TEST 4.4				TARGET 5 MASK DATA			
AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
150.9	500	4.7	3	151.7	500	4.1	2
151.7	3500	4.1	1	154.3	4000	4.3	1
154.3	500	4.3	2	156.2	500	4.9	3
157.3	500	4.3	2	157.3	3900	4.3	1
160.1	3900	4.3	1	163.1	4400	4.2	1
165.6	4300	3.9	1	166.9	4300	3.8	1
117.0	3900	3.7	1	172.5	4200	3.6	1
176.2	4400	3.4	1	179.1	3900	3.0	1
181.2	3700	2.6	1	183.2	3300	2.5	1
183.2	1300	2.5	2	183.9	1300	3.0	2
187.8	1100	2.4	2	187.8	9800	2.4	1
190.2	11800	2.7	1	190.2	1000	2.5	2
193.5	10900	2.9	1	193.5	1100	2.7	2
194.7	8200	2.8	1	194.7	1400	2.7	2
197.5	9800	2.7	1	197.5	1000	2.6	2
198.9	9800	2.7	1	198.9	1000	2.6	2
199.9	11800	2.6	1	199.9	1000	2.3	2
200.0	1000	2.4	2	201.4	1000	3.4	2
202.0	1000	2.7	2	203.0	1200	3.1	2
203.7	1100	2.5	2	206.3	1000	3.8	2
207.3	1200	2.5	2	209.2	1200	2.3	2
210.2	1200	2.5	2	212.5	1300	2.2	2
215.1	1200	2.3	2	217.0	1200	2.5	2
219.2	1100	2.1	2	221.8	500	3.1	2
224.5	500	2.9	2	226.9	600	3.6	2
228.5	700	3.4	2	230.3	600	2.2	2
232.8	600	1.6	2	233.4	600	1.0	2
234.9	1600	.8	2	236.1	1600	1.1	2
238.2	1500	1.0	2	238.9	400	4.8	3
243.3	400	4.8	3	243.2	2000	.9	2
245.8	600	1.1	2	246.5	700	1.3	2
249.6	300	2.1	2	251.0	300	2.8	2
253.4	300	2.7	2	255.2	600	3.2	2
256.8	600	1.8	2	259.5	300	3.5	2
262.0	600	2.2	2	265.5	800	2.5	2
270.2	700	2.3	2	274.9	400	2.2	2
276.6	300	4.2	2	278.2	500	2.8	2
281.9	300	4.2	2	293.2	400	4.7	2
294.9	6900	4.1	1	294.9	400	3.3	2
297.1	6900	4.1	1	297.1	400	3.8	2
299.9	400	5.4	2	300.8	5900	4.2	1
300.8	400	4.0	2	303.7	5600	4.4	1
303.7	300	3.9	2	306.9	5900	4.3	1
306.3	300	3.6	2	307.3	300	6.4	2
310.9	300	6.4	2	311.2	5200	4.4	1

JTF-2 TEST 4.4 TARGET 5 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
311.2	400	3.6	2	314.3	5400	4.2	1
314.3	300	3.9	2	319.0	5600	3.8	1
319.0	800	3.6	2	319.7	900	4.6	2
321.0	900	4.3	2	322.2	900	4.5	2
323.6	1000	3.7	2	325.7	800	3.7	2
327.0	300	6.7	2	330.0	200	5.9	2
334.8	300	6.3	2	339.0	200	5.0	2
340.5	8200	1.8	1	343.5	8200	1.7	1
345.0	8200	1.9	1	345.3	100	9.5	3
353.5	100	9.5	3	353.9	6600	2.7	1
356.2	6600	3.0	1	357.8	6600	3.1	1
359.5	6600	3.2	1	360.0	200	3.8	3
360.2	6600	3.2	1	363.0	6100	3.4	1

JTF-2 TEST 4.4				TARGET 6 MASK DATA			
AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	500	2.9	2	2.4	600	2.7	2
4.3	400	2.1	2	6.7	500	3.1	2
9.5	600	1.8	2	12.1	500	2.6	2
15.0	500	1.9	2	15.5	4100	1.2	2
17.5	600	2.4	2	19.1	3900	.9	2
20.3	500	2.4	2	22.6	600	3.1	2
24.5	400	3.1	2	27.1	300	3.8	2
29.3	500	4.0	2	31.5	300	4.2	2
33.5	300	4.2	2	36.5	300	5.0	2
39.5	400	5.3	2	43.3	300	5.3	2
46.5	300	6.4	2	52.3	200	7.7	2
55.7	200	6.8	2	60.3	200	9.0	2
65.8	200	8.3	2	70.8	200	9.9	2
73.7	200	9.5	2	77.4	200	8.8	2
85.2	200	7.6	2	89.7	200	6.0	2
91.1	200	10.6	2	96.6	200	10.6	2
100.4	200	6.6	2	104.5	200	6.7	2
110.2	200	6.9	2	112.5	300	6.1	2
115.8	300	6.4	2	119.7	300	6.2	2
123.5	400	3.4	2	125.9	300	4.5	2
129.9	300	5.5	2	131.5	300	3.2	2
131.5	6600	3.2	1	134.1	6900	3.2	1
137.5	6400	3.4	1	140.5	5900	3.5	1
143.4	6100	3.7	1	146.3	6100	3.7	1
149.6	1800	3.8	1	152.1	600	3.7	1
155.2	5400	3.8	1	158.3	5400	3.7	1
161.4	5600	3.5	1	164.2	5200	3.5	1
167.2	5200	3.4	1	169.8	4900	3.3	1
173.2	1300	3.3	1	174.9	2300	3.4	1
176.1	200	12.4	3	185.1	200	12.4	3
185.1	1200	3.5	1	188.1	1600	3.4	1
190.2	2100	3.4	1	194.2	2300	3.5	1
197.3	1500	3.1	1	200.6	900	3.5	1
203.5	2400	3.2	1	206.5	1800	2.9	1
210.3	1000	3.0	1	213.5	2200	2.8	2
216.7	900	3.8	2	219.2	900	3.8	2
227.3	800	3.8	2	228.6	1000	3.3	2
229.5	700	4.4	2	232.3	200	4.7	2
235.7	800	3.4	2	238.5	100	3.7	2
241.3	1000	3.3	2	243.5	800	4.0	2
246.6	700	3.6	2	249.2	700	4.1	2
251.4	600	4.0	2	254.1	600	3.2	2
257.6	500	3.3	2	260.8	800	2.8	2
263.5	900	2.5	2	266.2	900	2.7	2
269.7	500	2.9	2	272.6	900	1.6	2

JTF-2 TEST 4.4 TARGET 6 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
275.6	800	2.5	2	276.9	800	1.4	2
276.9	8500	1.4	1	278.1	8500	1.5	1
278.2	2600	1.2	2	278.9	900	1.4	2
278.9	8500	1.4	1	279.3	900	1.9	2
282.3	900	2.1	2	285.5	600	1.7	2
287.7	900	2.0	2	290.2	1000	2.1	2
293.2	2000	2.4	2	295.2	500	2.8	2
297.7	500	3.3	2	300.1	500	4.5	2
303.1	500	3.8	2	305.3	500	4.7	2
308.3	500	3.2	2	311.2	500	3.1	2
314.6	500	3.4	2	317.5	500	2.8	2
321.4	500	3.4	2	324.4	600	3.5	2
327.5	500	2.8	2	328.2	100	13.7	2
347.4	100	14.8	2	355.7	200	3.1	2
357.6	500	2.5	2	360.0	500	2.9	2
362.4	600	2.7	2				

JTF-2 TEST 4.4 TARGET 7 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	200	8.5	2	8.0	200	10.9	2
15.0	200	11.0	2	10.5	300	7.3	2
22.5	300	9.4	2	26.5	400	3.7	2
31.0	400	4.2	2	35.0	400	5.0	2
39.2	400	5.4	2	43.0	400	3.2	2
45.2	400	3.4	2	48.5	500	3.3	2
50.5	500	4.0	2	55.0	400	5.9	2
57.7	400	4.9	2	60.7	400	4.4	2
64.0	300	4.7	2	67.8	400	6.1	2
70.2	300	7.1	2	74.7	300	8.4	2
77.8	200	8.2	2	82.5	300	7.2	2
86.5	200	9.2	2	93.5	2500	9.7	2
95.3	200	6.7	2	102.2	200	10.8	2
107.6	200	9.8	2	114.5	200	7.9	2
117.2	300	8.7	2	123.0	200	10.1	2
127.5	200	9.7	2	132.6	200	7.3	2
136.5	200	10.2	2	142.4	200	11.2	2
147.5	200	14.4	2	156.1	200	14.5	2
162.0	200	8.0	2	165.7	200	10.2	2
170.0	200	15.7	2	175.4	200	11.7	2
181.5	200	9.2	2	183.5	200	12.6	2
191.5	200	12.6	2	192.5	200	5.7	2
193.5	300	9.1	2	197.5	300	9.1	2
199.5	200	6.3	2	202.0	300	5.8	2
204.9	400	6.0	2	207.5	200	6.3	2
210.7	400	5.3	2	213.5	300	3.6	2
215.0	400	3.7	2	218.2	400	2.8	2
220.4	400	3.9	2	222.8	400	5.2	2
226.2	400	3.2	2	230.5	400	2.2	2
232.7	500	2.7	2	235.5	400	3.0	2
239.4	500	1.4	2	242.3	400	2.0	2
247.9	500	2.4	2	250.5	400	3.1	2
254.0	300	2.9	2	255.0	300	4.7	2
257.5	200	5.9	2	260.8	200	8.5	2
268.0	200	8.8	2	271.9	200	8.3	2
277.4	200	8.0	2	284.0	200	9.3	2
295.0	200	12.6	2	301.0	200	9.6	2
306.5	300	4.9	2	309.5	100	14.8	2
322.7	100	14.8	2	331.7	100	14.8	2
337.7	200	8.4	2	341.0	300	6.8	2
346.0	200	11.2	2	353.8	200	6.9	2
360.0	200	8.5	2				

JWF-2 TEST 4.4 TARGET 8 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
.8	400	6.8	2	2.2	400	4.0	2
4.0	400	7.4	2	5.0	700	4.1	2
8.0	700	4.2	2	8.5	400	6.2	2
9.0	700	4.0	2	10.0	400	6.0	2
11.2	400	9.6	2	12.2	400	10.4	2
14.2	300	11.5	2	16.5	300	11.9	2
18.3	300	10.1	2	20.0	300	7.4	2
22.0	400	9.6	2	24.0	400	8.5	2
26.0	400	7.5	2	28.0	400	6.9	2
30.0	700	5.0	2	34.0	700	5.0	2
36.0	700	4.9	2	38.0	700	4.9	2
40.0	700	4.2	2	42.0	800	4.2	2
44.0	600	5.6	2	46.0	600	5.3	2
48.0	600	5.8	2	50.0	600	5.7	2
52.0	600	4.7	2	53.0	600	3.5	2
53.0	14500	3.5	1	54.0	13800	3.0	1
54.8	13400	3.1	1	54.8	7200	3.1	1
56.0	6900	3.5	1	58.0	6600	4.2	1
60.0	6100	4.6	1	62.0	5900	5.0	1
64.0	5800	5.5	1	66.0	5600	5.8	1
68.0	5200	6.1	1	70.0	4900	6.4	1
72.0	5200	6.6	1	74.0	4900	6.8	1
76.0	4600	7.0	1	78.0	4300	7.2	1
80.0	4100	7.5	1	82.0	3900	7.9	1
84.0	3700	8.4	1	84.0	300	8.4	2
86.0	300	10.8	2	88.0	300	10.8	2
90.0	300	8.7	2	90.0	3400	8.7	1
92.0	3500	8.6	1	94.0	3500	8.6	1
96.0	3600	8.4	1	98.0	3600	8.2	1
100.0	3600	8.2	1	101.0	3600	7.6	1
101.0	5900	7.6	1	102.0	5900	7.7	1
104.0	5900	7.8	1	106.0	5600	8.2	1
108.0	5500	8.7	1	110.0	5100	9.0	1
112.0	5200	9.0	1	114.0	5200	9.3	1
116.0	5200	9.4	1	118.0	5300	9.4	1
120.0	5100	9.4	1	122.0	5000	9.3	1
124.0	4900	9.1	1	126.0	5200	9.0	1
128.0	5600	8.9	1	130.0	6100	8.9	1
132.0	5900	8.8	1	134.0	5800	9.0	1
136.0	5700	9.0	1	138.0	5700	9.5	1
114.0	5700	9.4	1	142.0	5700	9.3	1
144.0	5700	9.1	1	146.0	5800	8.9	1
148.0	5900	8.6	1	150.0	6100	8.2	1
150.8	6300	7.8	1	150.8	3900	7.8	1
152.0	4000	8.2	1	154.0	4100	8.1	1

JTF-2 TEST 4.4 TARGET 8 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
156.0	4100	8.0	1	158.0	4100	8.1	1
158.0	100	8.1	2	160.0	100	21.3	2
162.0	100	21.1	2	164.0	100	21.1	2
166.0	100	21.6	2	168.0	100	26.9	2
170.0	100	27.3	2	172.0	100	28.0	2
174.0	100	27.8	2	176.0	100	28.3	2
178.0	100	28.2	2	180.0	100	24.2	2
182.0	100	23.0	2	184.0	100	23.8	2
186.0	100	25.0	2	188.0	100	25.2	2
190.0	100	25.8	2	192.0	100	23.4	2
194.0	100	21.9	2	196.0	100	20.3	2
198.0	100	14.0	2	200.0	100	19.2	2
202.0	100	18.1	2	204.0	100	26.8	2
206.0	100	24.0	2	208.0	100	26.5	2
210.0	100	28.3	2	212.0	100	26.4	2
214.0	100	26.1	2	216.0	100	29.4	2
218.0	100	30.4	2	220.0	100	30.6	2
222.0	100	30.7	2	224.0	100	29.0	2
226.0	100	30.3	2	228.0	100	23.6	2
230.0	100	22.8	2	232.0	100	17.8	2
234.0	100	19.4	2	236.0	100	18.8	2
238.0	100	15.7	2	240.0	100	15.8	2
242.0	200	17.1	2	244.0	200	17.3	2
246.0	200	16.5	2	248.0	200	16.5	2
250.0	200	13.2	2	252.0	200	12.1	2
254.0	200	12.1	2	256.0	200	12.6	2
258.0	200	12.2	2	260.0	200	9.6	2
262.0	200	7.0	2	264.0	400	5.5	2
266.0	400	5.4	2	268.0	500	4.5	2
270.0	500	4.8	2	272.0	500	4.6	2
274.0	700	4.5	2	274.0	8900	4.5	1
276.0	9100	4.6	1	278.0	8700	4.7	1
280.0	8700	4.8	1	282.0	8600	5.1	1
284.0	8500	5.1	1	284.0	500	5.1	2
286.0	300	8.6	2	288.0	300	9.0	2
290.0	300	10.5	2	292.0	200	12.6	2
294.0	200	13.0	2	296.0	200	13.6	2
298.0	200	14.4	2	300.0	200	14.9	2
302.0	200	13.3	2	304.0	200	12.1	2
306.0	200	11.1	2	308.0	200	9.7	2
310.0	200	10.9	2	312.0	200	9.7	2
314.0	300	8.6	2	316.0	300	10.5	2
318.0	300	10.2	2	320.0	400	9.8	2
322.0	400	8.2	2	324.0	400	8.2	2
326.0	500	8.3	2	328.0	500	8.2	2

JTF-2 TEST 4.4 TARGET 8 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
332.0	500	8.2	2	334.0	500	9.0	2
336.0	500	8.6	2	338.0	500	8.5	2
340.0	500	8.9	2	342.0	500	8.9	2
344.0	500	7.8	2	346.0	500	7.8	2
348.0	500	7.8	2	350.0	700	5.9	2
352.0	400	6.5	2	354.0	700	4.6	2
356.0	400	6.2	2	357.4	400	6.4	2
358.8	400	4.4	2	360.8	400	6.8	2
362.2	400	4.0	2				

JTF-2 TEST 4.4				TARGET 10 MASK DATA			
AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	300	6.5	2	.8	300	6.0	2
.8	4800	6.0	1	3.9	4600	6.4	1
5.8	4600	6.5	1	7.9	4600	6.6	1
7.9	300	6.6	2	12.6	300	10.7	2
18.4	300	5.6	2	18.4	5100	5.6	1
21.1	5200	5.3	1	23.7	5600	5.0	1
23.7	300	5.0	2	26.3	300	6.0	2
28.9	300	4.4	2	28.9	5600	4.4	1
32.5	6300	4.0	1	35.3	5600	4.0	1
39.3	6600	3.8	1	42.0	7200	3.4	1
42.0	400	3.4	2	44.3	400	5.6	2
46.1	400	5.6	2	46.1	9200	2.9	1
48.2	9200	2.8	1	48.2	500	2.8	2
49.5	500	3.3	2	50.3	500	2.4	2
50.3	9800	2.4	1	53.0	11200	2.1	1
53.0	500	2.1	2	54.3	500	3.0	2
57.5	600	3.0	2	60.5	600	2.9	2
64.4	800	2.9	2	68.1	900	1.6	2
70.7	900	1.4	2	72.7	900	.8	2
75.2	1000	.6	2	75.2	32800	.6	1
76.2	32800	.6	1	76.3	2300	.4	2
78.1	32800	.5	1	78.1	2200	.5	2
79.4	32800	.7	1	79.5	1300	.6	2
82.0	32800	.8	1	82.0	1300	.6	2
83.1	32800	.8	1	83.1	1200	.5	2
84.4	32800	.8	1	84.4	1300	.5	2
86.8	26200	.9	1	86.8	1600	.6	2
83.1	32800	1.0	1	88.7	2700	.5	2
89.9	18000	.9	1	89.9	2800	.6	2
90.7	25300	1.0	1	105.2	16400	2.2	1
108.2	13200	2.3	1	110.8	13100	2.5	1
113.0	11200	2.6	1	116.5	11200	2.5	1
118.3	13100	2.8	1	121.5	11200	2.8	1
123.9	9200	2.9	1	125.9	10800	2.9	1
128.7	9200	3.0	1	131.5	7900	2.9	1
132.6	10100	2.9	1	134.1	11200	2.9	1
136.0	8500	3.1	1	139.0	8200	3.2	1
141.2	8700	3.2	1	145.2	8900	3.5	1
148.2	7900	3.6	1	150.7	8200	3.6	1
153.6	8900	3.4	1	156.6	8500	3.6	1
159.2	9800	3.6	1	161.1	8200	3.4	1
163.1	9500	3.2	1	166.3	10100	3.2	1
169.1	9800	3.1	1	172.2	8200	3.4	1
175.5	10100	3.5	1	179.1	8900	3.4	1
181.7	8500	3.1	1	183.8	11200	2.8	1

JTF-2 TEST 4.4				TARGET 10 MASK DATA			
AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
186.6	11200	2.4	1	187.3	15100	2.5	1
189.3	18000	2.5	1	193.1	13100	2.4	1
194.9	12500	2.6	1	197.1	13100	2.7	1
200.0	12800	2.7	1	201.2	12500	2.6	1
202.8	11200	2.6	1	205.0	13800	2.2	1
206.9	13100	2.2	1	209.1	13800	2.0	1
210.1	18000	1.8	1	210.8	14500	1.9	1
212.8	13100	2.1	1	214.0	15100	2.2	1
215.3	18000	1.7	1	216.5	16400	1.7	1
218.4	18400	1.5	1	218.4	1000	1.5	2
222.5	900	1.8	2	225.5	800	1.8	2
226.6	800	1.2	2	227.2	32800	1.2	1
228.0	32800	1.0	1	228.3	900	1.4	2
229.0	500	1.5	2	230.4	1500	1.3	2
231.4	1500	.8	2	231.4	30800	.8	1
232.3	32800	.8	1	232.3	1000	.5	2
233.2	300	.5	2	233.2	32800	.5	1
233.9	600	1.5	2	236.4	600	2.1	2
237.7	1200	1.3	2	238.9	1200	.9	2
241.2	1200	1.3	2	244.7	1200	1.6	2
247.9	1200	1.6	2	247.9	32800	1.6	1
248.9	32800	1.8	1	248.9	1500	1.1	2
249.2	1300	1.8	2	249.2	32800	1.8	1
251.1	32800	1.8	1	251.1	1300	1.8	2
252.0	1300	1.7	2	252.0	19700	1.8	1
254.7	16400	1.8	1	254.9	1200	1.6	2
255.9	1300	1.8	2	255.9	13100	2.2	1
258.5	16700	2.2	1	258.5	1300	1.8	2
260.9	16400	2.7	1	260.9	1300	2.0	2
262.5	16400	2.7	1	262.5	1300	2.0	2
264.1	16400	2.5	1	264.1	9200	2.5	1
268.5	6600	3.6	1	271.4	7200	4.2	1
274.8	6600	4.7	1	278.2	6600	5.0	1
281.5	5600	5.4	1	284.6	5200	5.6	1
288.3	5700	5.9	1	292.9	5400	6.2	1
297.2	4600	6.6	1	302.5	4900	7.1	1
306.3	4300	7.3	1	310.9	4800	7.4	1
310.9	400	7.4	2	311.7	400	8.3	2
316.0	400	8.3	2	317.3	400	7.5	2
317.3	3700	7.5	1	321.3	4100	7.6	1
321.3	400	7.6	2	322.9	400	10.3	2
328.3	400	10.4	2	331.1	400	6.3	2
331.1	3700	6.3	1	333.1	4000	6.0	1
333.1	300	6.0	2	338.1	300	7.2	2
340.5	300	4.0	2	340.5	6600	4.0	1

JTF-2 TEST 4.4 TARGET 10 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
342.3	6600	5.1	1	342.3	300	5.1	2
343.9	300	8.8	2	348.7	300	4.4	2
348.7	8200	4.4	1	351.4	9200	4.5	1
351.4	300	4.5	2	353.5	300	8.3	2
356.9	300	8.3	2	360.0	300	6.5	2
360.8	300	6.0	2	360.8	4800	6.0	1
363.9	4600	6.4	1				

JTF-2 TEST 4.4 TARGET 11 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	200	5.9	2	2.0	200	6.6	2
4.0	200	5.9	2	8.0	300	5.0	2
10.0	300	4.7	2	12.0	300	4.4	2
14.0	300	4.5	2	16.0	300	5.8	2
18.0	300	5.7	2	20.0	300	5.1	2
22.0	300	5.3	2	24.0	300	6.1	2
26.0	400	4.8	2	28.0	400	4.3	2
30.0	400	5.2	2	32.0	400	6.4	2
34.0	500	4.9	2	36.0	500	1.6	2
36.0	1300	1.6	2	38.0	1300	1.9	2
40.0	1300	2.0	2	42.0	1300	1.8	2
44.0	1300	1.9	2	45.0	1300	1.5	2
46.0	1300	2.0	2	48.0	1300	1.9	2
50.0	1300	1.9	2	52.0	1100	2.0	2
54.0	1100	2.6	2	56.0	1100	2.3	2
58.0	800	2.6	2	60.0	700	3.0	2
62.0	700	3.6	2	64.0	600	4.3	2
66.0	600	3.0	2	68.0	500	2.9	2
70.0	300	3.6	2	72.0	300	2.5	2
74.0	300	4.0	2	76.0	300	7.2	2
78.0	300	6.2	2	80.0	300	7.6	2
82.0	300	7.3	2	84.0	200	7.5	2
86.0	200	7.3	2	88.0	200	9.6	2
90.0	200	9.5	2	92.0	200	8.5	2
94.0	200	9.4	2	100.0	300	9.4	2
102.0	200	10.6	2	104.0	200	12.0	2
106.0	200	8.9	2	108.0	200	13.8	2
110.0	200	16.2	2	112.0	200	16.2	2
114.0	200	15.0	2	116.0	200	11.8	2
118.0	200	11.2	2	120.0	200	10.5	2
122.0	200	9.8	2	124.0	200	10.3	2
126.0	200	7.9	2	128.0	200	8.4	2
130.0	200	7.6	2	132.0	200	9.9	2
134.0	200	9.5	2	136.0	200	7.1	2
138.0	200	8.2	2	140.0	200	10.9	2
142.0	200	7.6	2	144.0	200	7.6	2
146.0	300	6.1	2	148.0	300	5.4	2
150.0	300	6.1	2	152.0	300	5.8	2
154.0	300	6.0	2	156.0	300	5.5	2
158.0	300	3.3	2	160.0	300	9.4	2
162.0	300	6.2	2	164.0	300	5.9	2
166.0	200	8.2	2	168.0	200	9.0	2
170.0	200	9.3	2	172.0	200	8.6	2
174.0	200	8.1	2	176.0	200	9.2	2
178.0	200	9.6	2	180.0	200	8.0	2

JTF-2 TEST 4.4 TARGET 11 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
182.0	300	5.9	2	184.0	300	5.8	2
186.0	300	6.2	2	188.0	300	5.8	2
190.0	300	6.2	2	194.0	300	6.1	2
196.0	400	5.1	2	198.0	400	4.3	2
200.0	500	3.8	2	202.0	500	3.9	2
204.0	500	4.5	2	206.0	500	4.2	2
208.0	500	3.9	2	210.0	500	3.9	2
212.0	600	2.7	2	214.0	1200	2.1	2
216.0	1400	2.1	2	218.0	1400	2.1	2
220.0	1600	2.1	2	222.0	1600	1.5	2
222.0	18000	1.5	1	224.0	1100	1.8	2
224.5	20000	1.4	1	225.5	1100	2.1	2
227.0	1100	1.8	2	228.0	1100	1.2	2
228.0	25000	1.2	1	228.5	1600	1.4	2
229.5	1600	1.1	2	229.5	23800	1.1	1
230.5	1400	1.3	2	231.6	1400	.9	2
231.6	24200	.9	1	233.9	24000	.9	1
233.9	1300	.9	2	234.2	1300	1.2	2
234.2	24000	1.2	1	234.6	1300	.8	2
235.2	24000	.6	1	235.2	1600	.6	2
236.0	1600	.6	2	238.0	600	1.1	2
240.0	600	1.5	2	240.7	600	1.9	2
242.2	600	1.4	2	244.0	600	3.3	2
245.2	600	3.3	2	245.3	600	2.6	2
246.0	600	2.6	2	248.0	400	2.8	2
250.0	400	3.0	2	252.0	400	3.0	2
253.6	400	2.2	2	254.8	800	4.4	2
256.2	800	3.0	2	258.0	800	3.0	2
260.0	800	2.0	2	260.7	500	3.0	2
262.0	500	3.3	2	262.2	500	4.7	2
264.0	500	5.4	2	266.0	500	5.0	2
268.0	500	4.1	2	270.0	500	3.5	2
272.0	500	4.1	2	274.0	500	3.9	2
276.0	500	3.6	2	278.0	500	3.0	2
278.0	7700	3.0	1	282.0	7700	3.1	1
283.0	7500	3.1	1	283.0	400	3.1	2
283.6	400	4.0	2	286.0	400	4.0	2
288.0	400	5.0	2	290.0	400	3.9	2
290.0	7700	3.9	1	292.0	7500	4.0	1
294.0	7400	4.0	1	296.0	7200	4.2	1
298.0	7200	4.2	1	300.0	7100	4.3	1
302.0	7000	4.5	1	304.0	6800	4.6	1
306.0	6500	4.8	1	308.0	6400	4.8	1
310.0	6200	5.0	1	314.0	5800	5.0	1
316.0	5700	5.0	1	316.0	200	5.0	2

JTF-2 TEST 4.4 TARGET 11 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
318.0	200	7.4	2	324.0	200	7.4	2
326.0	200	7.6	2	328.0	200	7.0	2
330.0	200	7.0	2	332.0	200	7.6	2
336.0	200	7.6	2	338.0	200	6.6	2
340.0	200	6.7	2	346.0	200	6.7	2
348.0	200	9.2	2	350.0	200	6.0	2
360.0	200	5.9	2	362.0	200	6.6	2

JTF-2 TEST 4.4 TARGET 12 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	17700	1.0	1	2.5	17000	.7	1
3.2	17200	.8	1	4.6	17700	.6	1
4.6	21600	.6	1	5.9	100	4.3	2
22.3	100	4.3	2	30.4	2000	.7	2
36.1	8200	.9	1	40.7	7900	2.4	1
43.1	8200	2.6	1	45.2	8000	2.8	1
47.2	7900	2.9	1	48.7	7500	2.9	1
48.7	3700	2.9	1	50.8	3500	3.8	1
53.7	3400	3.9	1	55.7	3200	4.0	1
57.7	2800	4.9	1	59.2	3000	4.1	1
61.4	5900	4.2	1	63.2	5700	4.3	1
65.0	5900	4.5	1	67.4	5900	4.6	1
69.3	5100	4.6	1	71.6	3300	4.7	1
74.3	3400	5.0	1	76.1	3200	4.4	1
79.9	3300	4.9	1	82.1	3200	6.2	1
84.1	3300	6.5	1	86.1	3000	6.6	1
88.4	3200	6.9	1	91.1	3200	7.1	1
92.9	3200	7.2	1	94.5	3000	7.3	1
101.5	3000	7.3	1	103.5	2900	7.2	1
105.8	3200	7.2	1	109.2	3200	6.9	1
112.1	3300	6.1	1	114.0	3300	5.6	1
116.1	3200	4.8	1	118.1	2800	4.3	1
120.0	2800	3.9	1	122.0	3100	3.6	1
123.9	3100	3.4	1	124.1	3100	3.2	1
125.1	3100	3.1	1	125.1	4500	3.1	1
127.5	6100	3.0	1	130.3	6100	3.0	1
132.5	5900	3.0	1	134.2	5700	3.2	1
136.4	5600	3.1	1	138.5	5200	3.1	1
140.5	5200	3.2	1	142.5	5200	3.3	1
144.8	5700	3.4	1	147.1	6600	3.5	1
149.1	6600	3.5	1	151.2	5800	3.6	1
153.3	6600	3.6	1	158.2	6600	3.5	1
162.1	6900	3.4	1	164.1	7900	3.4	1
166.1	7200	3.4	1	168.2	7400	3.3	1
170.4	6900	3.2	1	170.4	1100	3.1	2
172.5	7000	3.2	1	172.5	800	3.1	2
174.5	6900	3.2	1	176.5	6600	3.2	1
178.5	800	3.0	2	181.3	6500	3.0	1
183.4	6500	2.9	1	185.5	6700	2.9	1
188.3	7300	2.6	1	190.4	7500	2.5	1
192.6	9500	2.2	1	194.5	10800	2.2	1
197.3	1100	2.2	2	203.4	1000	2.2	2
205.6	1100	2.9	2	206.9	700	2.2	2
210.3	700	3.3	2	213.3	500	4.6	2
217.4	500	4.5	2	221.3	500	4.8	2

JTF-2 TEST 4.4 TARGET 12 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
226.2	400	4.8	2	229.9	400	4.2	2
232.1	400	2.3	2	234.2	400	2.2	2
234.2	13100	2.2	1	236.5	13100	3.9	1
238.6	500	4.8	2	240.4	400	3.5	2
242.5	500	3.2	2	242.5	10500	3.5	1
243.2	500	3.2	2	243.2	10500	3.1	1
244.5	500	2.9	2	244.5	10500	3.1	1
247.0	500	1.6	2	247.0	10500	2.5	1
247.5	500	1.8	2	247.5	10500	2.4	1
249.5	10600	2.4	1	251.1	10800	2.6	1
252.2	11200	2.5	1	254.3	11200	2.2	1
254.3	600	1.3	2	254.7	12300	2.1	1
255.0	600	1.4	2	255.5	10500	2.4	1
255.9	900	2.0	2	256.4	10500	2.4	1
256.4	800	2.4	2	258.2	10500	2.5	2
258.2	800	2.5	2	260.4	1000	2.2	2
262.4	10500	2.5	1	262.4	1100	2.4	2
264.2	10700	2.6	1	264.2	1100	2.1	2
266.3	11200	2.8	1	266.3	1100	1.9	2
268.5	11200	2.8	1	268.5	700	2.0	2
270.4	10500	2.6	1	270.4	700	2.2	2
272.2	11200	2.6	1	272.2	700	2.0	2
274.2	900	2.1	2	276.4	12000	2.2	1
276.8	8900	2.2	1	276.8	900	2.2	2
277.8	900	2.5	2	280.1	800	2.2	2
284.6	900	2.5	2	287.7	900	2.7	2
289.6	800	2.1	2	294.3	800	2.0	2
297.0	1100	1.9	2	298.7	1100	1.5	2
298.7	15700	1.5	1	301.3	1000	.8	2
302.3	15700	1.5	1	302.3	900	1.5	2
304.4	16100	1.5	1	304.4	900	1.1	2
307.4	12500	1.4	1	307.4	1000	.6	2
309.6	15400	1.4	1	309.6	1200	1.2	2
312.3	16400	1.4	1	312.3	1200	.4	2
313.5	16600	1.4	1	313.5	1100	.4	2
314.5	16700	1.4	1	314.5	1000	1.2	2
317.4	15500	1.4	1	317.4	1000	.7	2
319.9	15500	1.5	1	319.9	1000	1.0	2
321.4	15800	1.5	1	321.4	1000	.2	2
323.5	15700	1.3	1	323.5	700	.8	2
325.3	15500	1.2	1	325.3	700	1.2	2
327.3	15500	1.3	1	327.3	800	1.3	2
328.9	15500	1.3	1	328.9	800	.8	2
331.4	15500	1.3	1	331.4	800	1.3	2
334.5	15000	1.4	1	334.5	800	.9	2

JTF-2 TEST 4.4 TARGET 12 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
336.3	14500	1.4	1	336.3	100	1.4	2
338.5	14000	1.2	1	338.5	100	.8	2
340.5	14500	2.7	1	344.4	15000	.7	1
350.8	16000	1.0	1	350.8	100	1.0	2
352.6	17000	.9	1	355.6	17500	1.0	1
360.0	17700	1.0	1	362.5	17000	.7	1
363.2	17200	.8	1				

JTF-2 TEST 4.4 TARGET 15 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	8500	2.4	1	2.2	8500	2.4	1
4.1	8800	2.3	1	6.2	9000	2.2	1
10.0	9500	2.2	1	12.3	10800	2.0	1
19.9	12500	1.5	1	22.2	14400	1.2	1
26.1	16500	.9	1	30.1	19000	.4	1
30.4	21000	.4	1	31.1	25000	.4	1
31.7	28500	.6	1	32.1	28100	.4	1
32.6	28800	.4	1	33.1	29100	.3	1
33.9	29300	.3	1	34.9	38900	.3	1
36.4	39000	.3	1	39.2	37500	.3	1
40.2	37700	.3	1	40.9	37900	.4	1
41.4	38300	.3	1	42.4	38600	.5	1
42.7	38500	.4	1	43.1	38500	.4	1
44.8	38500	.3	1	47.9	38500	.4	1
47.9	24700	.3	1	46.2	24700	.4	1
50.2	24400	.5	1	52.4	24300	.8	1
56.2	23800	.9	1	59.7	23500	1.0	1
64.1	22500	.9	1	65.9	23500	.8	1
71.2	26600	.9	1	73.1	21500	.8	1
75.2	24000	.8	1	75.2	2100	.2	1
77.1	24500	.9	1	77.1	2000	.4	1
79.3	25200	.6	1	80.1	27000	.4	1
82.0	30000	.4	1	82.0	1800	.4	1
84.2	29000	.5	1	84.2	1500	.5	1
85.1	28000	.6	1	85.1	1500	.2	1
85.8	27000	.5	1	85.8	1400	.3	1
86.9	26300	.6	1	87.4	26000	.5	1
88.8	25700	.8	1	91.1	25500	.9	1
92.1	25300	1.0	1	93.9	24000	1.0	1
93.9	1300	.4	1	97.0	1300	1.5	2
99.3	20700	.9	1	101.3	21200	1.2	1
101.3	1300	.4	1	103.2	19700	1.3	1
103.2	1200	.4	1	105.2	1200	.6	1
107.3	18500	1.3	1	107.3	1100	.5	1
108.5	18000	1.2	1	109.4	17500	1.4	1
111.4	17000	1.4	1	113.3	16300	1.5	1
114.1	16000	1.3	1	116.3	15700	1.4	1
118.6	15500	1.2	1	120.8	15400	1.1	1
120.8	1100	.6	1	123.1	14100	1.0	1
123.1	1100	.6	1	125.3	13500	1.3	1
127.3	13300	1.3	1	129.6	13100	1.4	1
131.7	13000	1.3	1	131.7	1000	.8	1
133.8	13300	1.3	1	133.8	900	.9	1
136.2	13600	1.1	1	137.8	13900	1.1	1
138.7	14200	1.0	1	138.7	800	.8	1

JTF-2 TEST 4.4 TARGET 15 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
140.8	14500	1.2	1	140.8	1000	.8	1
143.3	15400	1.0	1	143.3	1100	.9	1
145.4	16300	1.2	1	145.4	1300	.8	1
146.9	17000	1.2	1	146.9	1500	.8	1
149.1	17000	1.3	1	149.1	1600	.7	1
151.1	1800	.7	1	153.2	17000	1.2	1
153.2	1600	.7	1	155.3	17200	1.2	1
155.3	1900	.6	1	157.2	1700	.6	1
159.1	17700	1.1	1	159.1	1600	.5	1
161.4	14300	1.1	1	161.4	1400	.5	1
163.1	14300	1.0	1	163.1	1200	.4	1
165.2	14300	1.0	1	165.2	900	.4	1
167.1	14500	.9	1	168.1	14700	.8	1
168.1	1000	.1	1	170.9	15000	.8	1
172.1	17500	.5	1	173.3	20000	.8	1
174.8	20500	.9	1	177.1	21000	1.0	1
180.0	23500	1.0	1	180.9	25500	.9	1
182.3	26500	1.0	1	185.7	28000	.9	1
187.5	25500	.9	1	189.9	31500	.7	1
189.9	23300	.8	1	192.3	21800	1.4	1
193.2	22100	1.4	1	193.9	22400	1.3	1
196.1	22700	1.3	1	200.1	23600	1.2	1
201.8	24200	1.0	1	204.2	24700	.6	1
204.2	1100	.6	1	207.1	400	1.1	2
210.2	400	1.2	2	213.2	400	2.4	2
216.3	400	3.1	2	219.0	300	2.5	2
221.6	500	2.4	2	222.8	39500	.9	1
222.8	2800	.6	1	224.3	37000	.9	1
224.3	2800	.6	1	225.4	35500	.6	1
225.4	900	.6	1	227.2	2800	.5	1
228.2	2600	.7	1	228.2	17500	.7	1
229.1	18500	.9	1	229.1	2300	.7	1
231.4	18500	.6	1	231.4	2100	.6	1
235.2	19500	1.2	1	235.7	18800	1.2	1
237.2	18100	1.1	1	238.9	17500	1.1	1
240.8	21000	.9	1	242.7	24000	.8	1
242.7	1700	.8	1	244.2	1600	.9	1
246.1	1400	1.0	1	254.2	1200	1.1	1
256.2	1100	1.0	1	256.7	1000	1.0	1
256.7	14700	1.0	1	259.0	14000	1.3	1
261.3	13300	1.2	1	261.3	1200	1.1	1
265.3	12000	1.6	1	265.3	1200	1.1	1
267.2	1000	1.2	1	269.2	11300	1.7	1
269.2	700	1.2	1	271.1	10800	1.9	1
273.2	10500	2.0	1	281.1	10000	2.4	1

JTF-2 TEST 4.4 TARGET 15 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
283.0	8000	2.5	1	285.0	7700	2.6	1
287.0	7500	2.7	1	289.0	7500	2.7	1
291.0	8300	2.8	1	293.0	8500	2.9	1
295.0	10000	3.0	1	305.0	10000	3.3	1
307.0	9800	3.3	1	309.0	9700	3.2	1
311.0	9500	3.2	1	313.0	9400	3.2	1
315.0	9200	3.2	1	317.0	9000	3.3	1
329.0	8000	2.9	1	333.3	7700	2.7	1
335.0	7500	2.7	1	345.0	7500	2.5	1
347.0	7900	2.6	1	351.0	8100	2.6	1
353.0	8200	2.6	1	360.4	8500	2.4	1
362.2	8500	2.4	1				

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JTF-2 TEST 4.4 TARGET 16 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
190.5	200	4.7	2	190.5	5000	4.7	1
192.0	5200	4.7	1	193.6	5300	4.7	1
193.6	200	4.7	2	196.8	200	7.2	2
198.0	200	6.0	2	200.0	200	4.6	2
201.0	200	4.2	2	202.0	300	4.6	2
204.0	300	4.2	2	204.8	400	4.0	2
204.8	6100	4.0	1	206.0	6100	3.9	1
208.0	6200	3.6	1	210.0	6400	3.6	1
212.0	6500	3.4	1	214.0	6700	3.3	1
216.0	6900	3.1	1	218.0	7200	2.9	1
221.1	7400	3.0	1	221.1	300	3.0	2
224.0	300	4.1	2	225.8	300	3.1	2
225.8	7500	3.1	1	228.0	7500	3.0	1
232.9	7500	3.0	1	232.9	300	3.0	2
234.0	300	3.7	2	236.0	300	5.8	2
238.0	300	6.2	2	240.0	300	4.9	2
242.0	300	5.1	2	244.0	300	5.5	2
246.0	300	4.1	2	248.0	200	5.9	2
250.0	200	5.2	2	252.0	200	6.1	2
254.0	200	6.6	2	256.0	200	5.7	2
258.0	200	4.9	2	260.0	200	5.3	2
262.0	200	4.0	2	264.0	200	5.5	2
266.0	200	5.7	2	268.0	200	4.7	2
270.0	200	4.8	2	272.0	200	4.8	2
274.5	200	3.2	2	276.0	200	4.2	2
278.0	200	6.0	2	280.0	200	7.2	2
282.0	200	7.2	2	284.0	200	9.2	2
286.0	100	9.7	2	288.0	100	9.6	2
290.0	100	10.0	2	292.0	100	7.5	2
294.0	100	4.6	2	296.0	200	5.7	2
298.0	200	5.6	2	300.0	200	2.8	2
300.0	6400	2.8	1	302.5	6400	2.8	1
302.5	200	2.8	2	304.0	200	5.2	2
306.0	200	6.7	2	308.0	200	8.7	2
310.0	200	8.5	2	312.0	200	7.7	2
314.0	200	7.0	2	316.0	200	7.5	2
318.0	200	6.8	2	320.0	200	6.7	2
322.0	200	7.5	2	324.0	200	3.1	2
324.0	8400	3.1	1	326.0	8700	2.0	1
328.0	9000	1.9	1	330.0	9400	1.7	1
332.0	9700	1.6	1	334.0	10300	1.5	1
336.0	10800	1.5	1	338.0	12000	1.4	1
339.3	12000	1.1	1	339.3	1400	1.1	2
339.8	1400	1.3	2	340.5	1400	.9	2
340.5	12000	.8	1	341.6	11500	.6	1

JTF-2 TEST 4.4 TARGET 16 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
341.6	29500	.6	1	344.0	31400	.5	1
344.0	1400	.5	2	345.4	1400	1.3	2
346.0	1400	.3	2	347.8	800	1.0	2
348.2	800	1.8	2	349.0	800	1.0	2
350.0	1000	.4	2	350.0	34700	.4	1
352.9	36000	.4	1	352.9	7600	.4	2
354.0	600	1.9	2	356.0	800	1.8	2
358.0	500	1.8	2	360.0	900	1.2	2
361.2	900	2.6	2	362.5	900	1.7	2
363.5	800	1.7	2				

JTF-2 TEST 4.4 TARGET 18 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	600	12.0	2	2.0	600	11.9	2
4.0	600	4.0	2	6.0	600	3.7	2
7.9	600	2.4	2	10.0	600	3.2	2
12.0	600	3.1	2	14.1	600	4.2	2
16.0	600	5.3	2	18.0	600	5.1	2
20.0	500	4.3	2	22.0	500	3.8	2
24.0	400	3.6	2	26.0	400	3.9	2
28.0	500	5.6	2	30.0	500	5.4	2
32.0	500	5.3	2	34.0	500	5.8	2
36.0	600	2.6	2	38.0	400	7.3	2
40.0	400	8.0	2	42.0	600	3.1	2
44.0	1400	2.4	2	46.0	1400	2.6	2
48.0	1400	2.6	2	50.0	400	7.0	2
52.0	400	7.3	2	54.0	400	5.7	2
56.0	300	5.4	2	58.0	300	5.4	2
60.0	300	5.9	2	62.0	300	7.8	2
64.0	300	5.3	2	66.0	700	4.6	2
68.0	700	5.8	2	70.0	400	4.9	2
72.0	300	5.8	2	74.0	300	5.8	2
76.0	400	6.9	2	78.0	400	7.9	2
80.0	300	7.9	2	82.0	300	8.4	2
84.0	300	8.5	2	86.0	300	7.8	2
88.0	300	7.4	2	90.0	400	6.0	2
92.0	400	6.8	2	94.0	400	6.5	2
96.0	400	7.0	2	98.0	400	6.6	2
100.0	400	7.5	2	102.0	400	7.4	2
104.0	400	6.9	2	106.0	400	5.8	2
108.0	400	5.6	2	110.0	400	5.6	2
112.0	400	5.8	2	114.0	500	5.8	2
116.0	500	4.4	2	118.0	600	2.8	2
120.0	500	4.3	2	122.0	700	4.7	2
124.0	600	4.3	2	126.0	600	4.2	2
128.0	500	4.8	2	130.0	600	4.8	2
132.0	600	4.4	2	134.0	500	5.5	2
136.0	500	5.5	2	138.0	500	6.5	2
140.0	500	5.8	2	142.0	500	5.8	2
144.0	600	5.5	2	146.0	500	6.1	2
148.0	500	6.8	2	150.0	500	6.5	2
152.0	700	4.8	2	154.0	400	6.9	2
156.0	400	7.2	2	158.0	400	7.5	2
160.0	500	6.9	2	162.0	500	6.2	2
164.0	500	6.2	2	166.0	500	7.9	2
168.0	500	6.3	2	170.0	400	7.4	2
172.0	400	7.8	2	174.0	400	7.0	2
176.0	400	5.6	2	178.0	400	7.5	2

JTF-2 TEST 4.4 TARGET 18 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
180.0	400	8.0	2	182.0	400	7.8	2
184.0	400	7.3	2	186.0	500	7.1	2
188.0	500	6.7	2	190.0	400	5.1	2
192.0	400	8.1	2	194.0	400	7.4	2
196.0	500	5.2	2	198.0	500	4.9	2
200.0	600	4.9	2	202.0	500	5.3	2
204.0	500	5.1	2	206.0	500	5.1	2
208.0	500	6.8	2	210.0	500	7.6	2
212.0	500	6.1	2	214.0	400	5.0	2
216.0	400	7.4	2	218.0	400	7.6	2
220.0	400	6.7	2	222.0	400	6.9	2
224.0	400	8.1	2	226.0	400	10.0	2
228.0	300	8.9	2	230.0	400	10.5	2
232.0	300	10.9	2	234.0	300	10.0	2
236.0	300	10.0	2	238.0	300	10.2	2
240.0	300	9.5	2	242.0	300	9.9	2
244.0	300	9.9	2	246.0	300	10.6	2
248.0	300	9.5	2	250.0	300	8.7	2
252.0	300	9.3	2	254.0	300	9.3	2
256.0	300	9.6	2	258.0	300	9.1	2
260.0	300	9.5	2	262.0	300	7.9	2
264.0	300	8.7	2	266.0	400	7.4	2
268.0	400	6.3	2	270.0	500	5.8	2
272.0	700	1.8	2	274.0	700	2.6	2
276.0	700	2.8	2	278.0	800	2.8	2
279.0	800	2.2	2	280.0	800	2.7	2
282.0	800	2.6	2	284.0	900	3.4	2
286.0	900	2.3	2	287.0	900	1.7	2
287.0	13100	1.7	1	288.0	13100	1.7	1
288.0	5200	1.7	1	288.5	5200	1.7	1
288.5	1100	1.7	2	289.5	1100	2.3	2
290.0	1100	1.8	2	290.0	5200	1.8	1
292.0	5100	1.9	1	294.0	4900	2.0	1
296.0	4900	2.2	1	298.0	4900	2.3	1
300.0	4900	2.4	1	300.0	1000	2.4	2
301.5	1000	2.5	2	301.5	4800	2.5	1
304.0	4300	2.6	1	306.0	5600	2.5	1
306.0	1100	2.5	2	308.0	1000	2.8	2
309.0	100	2.3	2	309.0	4600	2.3	1
310.0	4600	2.3	1	313.5	4600	2.2	2
313.5	1000	2.2	2	314.0	1000	2.1	2
315.0	1000	2.1	2	315.0	4600	2.1	1
315.8	4600	2.1	1	315.8	900	2.1	2
318.0	1000	2.3	2	320.0	900	2.1	2
322.0	900	1.8	2	324.0	900	2.6	2

JTF-2 TEST 4.4 TARGET 18 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
326.0	900	2.0	2	328.0	900	2.0	2
330.0	700	3.2	2	332.0	700	3.5	2
334.0	600	4.5	2	336.0	600	3.5	2
338.0	800	2.8	2	340.0	700	3.3	2
342.0	800	2.3	2	344.7	800	1.5	2
344.7	3100	1.5	1	348.0	3300	1.8	1
350.0	3100	2.0	1	352.0	3100	2.1	1
354.0	3000	2.2	1	354.8	3000	2.0	1
354.8	600	2.0	2	356.7	600	4.3	2
358.0	600	4.4	2	360.0	600	12.0	2
362.0	600	11.9	2				

JTF-2 TEST 4.4 TARGET 19 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	11200	2.5	1	0.0	1600	2.2	2
.4	11200	2.4	1	.4	1400	2.2	2
2.9	12500	2.8	1	2.9	1400	2.0	2
6.0	11800	2.5	1	6.0	1400	1.8	2
7.3	13100	2.3	1	7.3	1600	1.8	2
8.7	13100	2.3	1	8.7	1600	2.1	2
11.6	13100	2.0	1	11.6	1600	1.8	2
13.2	13100	1.7	1	13.2	1600	1.7	2
13.7	1600	1.9	2	14.3	1300	2.4	2
15.7	1100	1.8	2	17.2	1100	2.4	2
19.8	2900	1.6	2	22.1	1400	1.5	2
23.6	800	2.5	2	27.2	800	2.9	2
28.7	2900	1.2	2	30.2	900	3.8	2
33.6	600	2.9	2	35.7	1600	2.5	2
37.2	500	3.3	2	39.4	500	4.2	2
43.4	500	4.5	2	46.2	500	2.7	2
49.8	400	5.7	2	55.3	400	3.2	2
57.8	500	4.5	2	62.8	400	5.5	2
67.2	400	5.0	2	68.2	7900	3.9	1
69.5	7500	4.0	1	71.7	6600	4.2	1
72.4	300	5.6	2	79.5	300	6.2	2
81.6	5900	5.1	1	84.5	5900	5.3	1
87.5	6600	5.5	1	90.2	6300	5.7	1
93.5	5200	6.0	1	96.5	4900	6.2	1
99.4	4900	6.3	1	101.2	5200	6.4	1
101.4	300	6.9	3	104.5	300	6.9	3
105.3	4900	6.6	1	108.3	4900	6.8	1
111.2	4900	6.9	1	114.2	4200	6.9	1
117.2	4300	7.1	1	117.2	400	7.1	2
119.2	400	8.0	2	122.2	400	7.1	2
122.2	4500	7.1	1	131.4	4500	7.2	1
134.2	4400	7.1	1	149.5	4900	6.8	1
152.2	4900	6.6	1	156.0	5100	6.4	1
156.0	300	6.4	2	157.8	300	7.4	2
165.0	300	7.9	2	167.9	200	10.7	2
171.2	200	13.4	2	177.5	200	13.4	2
183.4	200	9.4	2	191.3	200	9.4	2
192.4	200	11.1	2	196.3	200	11.1	2
200.6	300	9.9	2	205.2	300	9.9	2
207.5	200	9.7	2	211.0	300	11.3	2
215.8	200	11.1	2	218.6	200	10.3	2
221.2	200	7.6	2	223.9	200	7.6	2
224.5	400	6.6	2	227.2	400	6.6	2
228.9	200	10.1	2	233.1	200	10.1	2
235.7	300	11.4	2	238.5	300	8.5	2

JTF-2 TEST 4.4 TARGET 19 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
243.5	300	8.5	2	245.6	300	10.3	2
250.5	300	10.3	2	254.4	300	7.2	2
256.7	300	8.7	2	262.5	300	9.2	2
265.8	400	8.6	2	268.6	400	6.5	2
274.5	400	6.5	2	276.9	400	7.4	2
280.5	400	8.1	2	284.2	400	8.6	2
287.9	400	8.6	2	292.7	300	6.8	2
297.5	400	6.3	2	300.5	400	6.2	2
304.7	700	5.5	2	306.7	600	5.5	2
309.4	600	5.0	2	309.9	600	4.7	2
309.9	8200	4.7	1	313.0	7500	4.7	1
316.2	7900	4.8	1	319.2	7500	4.7	1
322.2	8200	4.4	1	325.4	7900	4.2	1
328.4	7300	4.2	1	331.0	8900	4.2	1
334.0	8900	4.1	1	337.2	7900	4.0	1
340.2	8200	3.9	1	343.2	8900	3.7	1
346.3	9800	3.4	1	349.1	8500	3.0	1
351.4	9800	2.7	1	351.4	1300	2.2	2
354.4	11200	2.7	1	354.4	1200	2.4	2
357.3	13100	2.7	1	357.3	1300	2.5	2
360.0	11200	2.5	1	360.0	1600	2.2	2
360.4	11200	2.4	1	360.4	1400	2.2	2
362.9	12500	2.8	1	362.9	1400	2.0	2

JTF-2 TEST 4.4 TARGET 20 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	100	8.6	2	11.7	100	11.4	2
16.9	900	3.3	2	18.2	100	7.2	2
21.8	100	16.5	2	34.2	100	16.5	2
35.7	100	8.5	2	39.9	100	13.7	2
42.6	1100	3.5	2	50.9	1400	2.9	2
51.0	100	13.1	2	56.2	100	13.1	2
58.2	1500	10.3	2	72.5	200	10.4	2
74.1	800	4.5	2	76.1	700	4.8	2
77.8	200	8.8	2	80.9	200	8.8	2
84.5	200	4.9	2	90.2	200	4.9	2
94.0	200	7.6	2	97.6	200	5.4	2
103.8	300	5.5	2	106.5	400	6.5	2
111.2	400	6.5	2	113.4	400	4.9	2
116.5	500	4.8	2	118.5	400	4.8	2
123.9	600	4.6	2	127.9	600	3.6	2
127.9	3400	3.6	2	132.0	3500	3.4	2
136.3	3800	3.4	2	140.1	3700	3.2	2
142.3	3500	3.2	2	144.1	9200	2.9	1
144.8	9500	2.8	1	146.8	11200	2.8	1
146.8	6600	2.6	1	146.8	1500	2.5	2
148.4	10500	2.8	1	148.4	6500	2.6	1
148.4	1500	2.4	2	151.2	400	5.5	2
152.3	1500	3.0	2	152.7	9800	2.9	1
153.8	11200	2.9	1	153.8	1400	2.8	2
155.8	12500	2.9	1	155.8	1400	2.7	2
157.5	11200	2.9	1	157.5	1200	2.9	2
162.2	1200	3.1	2	162.8	11200	2.8	1
162.8	1200	2.8	2	164.0	11800	2.7	1
164.0	1300	2.7	2	165.5	13100	2.5	1
165.5	1200	2.1	2	166.3	13100	2.4	1
166.3	1500	2.4	2	168.2	1200	2.9	2
170.5	9800	2.5	1	170.5	1000	2.5	2
171.4	900	2.4	2	173.2	11500	2.8	1
175.5	11500	2.8	1	175.5	700	2.8	2
176.5	700	5.2	2	180.2	600	6.0	2
183.7	600	5.4	2	186.8	500	5.2	2
187.5	500	3.7	2	188.5	700	4.4	2
191.3	600	5.3	2	193.1	700	4.3	2
197.0	500	4.5	2	199.1	600	4.2	2
200.8	500	5.1	2	206.8	500	5.3	2
211.3	500	4.2	2	214.2	500	4.7	2
218.2	400	4.4	2	220.7	400	5.9	2
223.2	400	5.2	2	225.5	500	4.7	2
228.7	400	5.8	2	232.4	400	7.0	2
234.5	400	6.0	2	239.4	400	7.5	2

JTF-2 TEST 4.4 TARGET 20 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
244.3	600	3.6	2	246.1	1000	3.9	2
249.0	800	4.0	2	250.5	600	4.0	2
252.0	1100	3.7	2	255.0	600	4.5	2
256.5	900	4.1	2	260.1	900	4.1	2
262.9	700	3.6	2	265.1	700	4.1	2
267.1	500	3.9	2	270.8	600	4.3	2
273.7	700	3.1	2	278.2	600	3.6	2
280.7	600	3.5	2	282.3	800	3.2	2
286.9	1000	3.4	2	289.1	1100	3.1	2
292.7	1000	3.1	2	294.2	500	3.0	2
297.6	500	4.0	2	302.0	400	5.8	2
307.2	500	5.5	2	309.9	400	3.4	2
313.2	800	4.8	2	315.2	700	2.8	2
318.2	900	2.2	2	320.4	700	2.2	2
322.4	600	4.5	2	324.8	600	4.5	2
325.4	500	3.2	2	327.5	500	3.2	2
329.3	400	4.6	2	332.4	400	3.5	2
334.0	400	4.3	2	336.7	400	4.3	2
337.5	400	5.9	2	341.2	300	8.3	2
347.3	300	8.4	2	349.3	200	12.1	2
353.0	200	12.1	2	356.9	100	12.2	2
360.0	100	8.6	2				

JTF-2 TEST 4.4 TARGET 23 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
0.0	300	6.5	2	1.3	400	7.6	2
2.2	500	4.0	2	2.8	300	6.5	2
4.4	700	6.8	2	7.5	200	6.9	2
9.3	200	4.7	2	10.0	500	4.3	2
12.0	300	3.2	2	13.0	300	1.9	2
14.0	400	2.7	2	14.4	400	3.9	2
15.7	400	1.5	2	15.7	2300	1.5	1
18.0	2500	1.1	1	20.0	2800	1.1	1
22.0	2000	1.0	1	24.0	2700	.7	1
26.0	4000	.5	1	27.5	4000	0.0	1
27.5	8200	0.0	1	30.0	8200	.1	1
32.0	8200	.1	1	34.0	8000	0.0	1
38.3	8200	0.0	1	38.3	19700	0.0	1
42.0	19700	0.0	1	44.0	18400	.2	1
48.0	16400	.2	1	48.0	12800	.2	1
50.0	13800	.2	1	54.0	13100	.3	1
56.0	13100	.4	1	58.0	11200	.5	1
60.0	10100	.6	1	64.0	10500	.8	1
66.0	11500	.8	1	68.0	9200	.9	1
70.0	7500	.9	1	72.0	10500	1.0	1
75.5	11200	1.0	1	75.5	200	4.7	2
77.5	200	5.3	2	79.2	200	3.8	2
82.9	200	1.4	2	86.5	100	3.5	2
88.0	100	4.3	2	90.0	100	4.6	2
92.0	100	5.1	2	92.9	100	1.5	2
92.9	8900	1.5	1	94.0	8900	1.5	1
94.0	100	1.5	2	96.0	100	4.5	2
98.0	100	4.7	2	100.0	100	4.8	2
102.0	100	3.9	2	103.5	100	1.8	2
103.5	7200	1.8	1	105.0	7200	1.8	1
105.0	100	1.8	2	106.0	100	3.0	2
108.0	100	2.2	2	110.0	100	2.7	2
112.0	100	3.7	2	114.0	100	1.9	2
116.0	100	2.1	2	118.0	100	2.9	2
120.0	100	4.2	2	124.0	100	3.7	2
126.0	100	4.2	2	128.0	100	5.0	2
130.0	100	5.0	2	130.9	100	1.6	2
132.0	100	3.7	2	134.0	100	2.0	2
136.0	100	7.3	2	138.0	100	6.5	2
140.0	100	5.2	2	142.0	100	3.3	2
144.0	200	3.8	2	146.0	200	3.3	2
148.0	100	3.5	2	150.0	100	4.9	2
152.0	100	5.6	2	154.0	300	1.5	2
156.0	300	1.5	2	156.0	7400	1.5	1
158.0	7300	1.4	1	160.0	7900	1.3	1

JTF-2 TEST 4.4 TARGET 23 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
162.0	7900	1.2	1	165.5	7900	1.2	1
165.5	200	1.2	2	166.0	200	2.3	2
168.0	200	2.3	2	170.0	200	1.4	2
172.0	200	1.9	2	173.8	300	1.1	2
173.8	8900	1.1	1	180.0	8900	1.2	1
180.0	200	1.2	2	182.0	400	3.4	2
184.0	400	2.5	2	186.0	400	2.3	2
188.0	400	3.5	2	190.0	500	1.7	2
192.0	700	2.1	2	194.0	600	1.9	2
195.0	400	2.7	2	196.0	400	2.2	2
198.0	600	2.9	2	200.0	800	2.2	2
202.0	800	3.3	2	204.0	800	2.0	2
206.0	800	2.8	2	208.0	800	1.7	2
210.0	800	2.0	2	212.2	800	1.8	2
213.2	400	3.2	2	214.0	400	2.8	2
216.0	400	2.5	2	218.0	600	2.7	2
220.0	400	4.4	2	222.0	400	5.0	2
224.0	400	6.1	2	226.0	400	7.1	2
227.3	300	8.3	2	228.7	300	7.1	2
230.3	200	9.0	2	231.8	200	9.0	2
233.2	200	10.9	2	236.0	200	11.5	2
238.0	200	12.2	2	240.0	200	11.3	2
242.0	200	15.0	2	246.0	200	13.2	2
248.0	200	12.2	2	250.0	200	15.2	2
252.0	200	17.7	2	254.0	200	18.7	2
256.0	200	18.9	2	258.0	200	17.3	2
260.0	200	16.9	2	262.0	200	16.1	2
264.0	200	16.2	2	268.0	200	16.9	2
270.0	100	18.9	2	272.0	100	20.3	2
276.0	100	20.6	2	278.0	200	19.5	2
280.0	200	18.7	2	282.0	100	18.6	2
284.0	100	18.1	2	286.0	100	18.0	2
288.0	100	20.6	2	290.0	100	21.6	2
292.0	100	20.3	2	294.0	100	20.9	2
296.0	100	21.1	2	298.0	100	20.7	2
300.0	100	21.9	2	302.0	100	21.2	2
304.0	100	20.1	2	306.0	100	19.1	2
308.0	200	18.1	2	310.0	200	18.1	2
312.0	200	20.8	2	314.0	200	19.2	2
316.0	100	17.1	2	318.0	100	14.7	2
320.0	100	14.5	2	322.0	100	15.1	2
324.0	100	16.5	2	326.0	100	16.0	2
328.0	100	15.6	2	330.0	100	14.0	2
332.0	100	14.3	2	334.0	100	14.6	2
336.0	100	13.0	2	338.0	200	14.6	2

JTF-2 TEST 4.4 TARGET 23 MASK DATA

AZ	RANGE	EL	CODE	AZ	RANGE	EL	CODE
340.0	200	14.5	2	342.0	200	15.3	2
344.0	200	13.0	2	346.0	100	13.7	2
348.0	100	13.0	2	350.0	200	13.3	2
352.0	200	9.9	2	354.0	200	8.8	2
356.0	200	9.8	2	358.0	200	9.9	2
360.0	300	6.5	2	361.3	400	7.6	2
362.2	500	4.0	2	362.8	300	6.5	2